CDN366 DeviceNet Gateway

Application Notes

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Revision

Initial Release ……..……. 6/12/01

Purpose:

This application note is intended to assist users to setup and configure the CDN366 DeviceNet ASCII gateway converter module with an Allen Bradley (AB)1747-SDN DeviceNet master scanner for the SLC500 programmable logic controller (PLC) series.

The users must have some basic knowledge of hardware and software.

Hardware: CDN366, AB PLC, AB 1747-SDN modules.
Software: RSLinx, RSNetworx, RSLogix500, and Microsoft Windows.

The user must have a basic knowledge of DeviceNet specifications and principles.

Hardware and Software Requirements:

The hardware and software requirement is based upon the application. For this particular application note, the hardware and software are set up based on the listing below. *Note, the configuration below is meant to demonstrate the CDN366 DeviceNet module integrated with an AB SLC502 PLC and not intended to ask users to use the same configuration.* Based on application requirements, the CDN366 can integrate with many brands of PLC (AB, Omron, etc.) or PC based platforms (Synergetic, etc.). As long as a DeviceNet network is available for a particular application, the CDN366 should be able to integrate in the network.

Hardware:

1) AB SLC500 4 slot rack, cat. #1747-A4, series B
2) AB SLC500 power supply, cat #1747-P1, series A
3) AB SLC502 CPU, cat.#1747-L524, series C
4) AB SLC500 scanner module, cat.#1747-SDN, series A
5) AB SLC500 8 input module, cat. #1747-IV8, series A (optional)
6) AB SLC500 8 output module, cat. #1747-OB8, series A (optional)
7) AB SLC500 personal computer interface module, cat. #1747-PIC, series A
8) AB SLC500 converter RS232 to DeviceNet, cat.#1770-KFD, series A
9) MKS DIP CDN366 DeviceNet gateway module
10) MKS DIP DIP790 DeviceNet distribution board
11) Connector and cable

Software:

1) AB SLC500 RSLinx & RSNetWorx for DeviceNet, Rev. 2.01.03-ENE
2) AB SLC500 RSLogix 500 programming, Rev. 4.00.00-ENE

For more information on the above products, please visit the web sites at …

1) CDN366 support documents … specs. manual, EDS files, examples
   www.mksinst.com/cgi-bin/product.exe?pid=cdn366
2) 1747-SDN DeviceNet Scanner Module: Installation Manual
   www.ab.com/manuals/io/1747/174758.pdf
3) Setup RSLinx, RSNetworx with 1747-SDN DeviceNet Scanner Module
   www.ab.com/manuals/cn/1747-um652b-en-p.pdf
4) SLC500 Instructions & Set Manual
   www.ab.com/manuals/cp/1747615.pdf
5) DeviceNet to RS232 Interface Converter Installation Instructions
   www.ab.com/manuals/cn/177056.pdf
6) DeviceNet to RS232 Interface Module Communication Protocol Ref. Manual
   www.ab.com/manuals/cn/17706522.pdf
7) SLC500 chassis, power supply, digital/analog/adapter modules
   www.ab.com/manuals/io/1746/index.html#1746adapter

Schematic Diagrams:

The electrical schematic diagram figure 1 shown on page 3, CDN366 is integrated with an Allen Bradley (AB) SLC502. The AB SLC500 four-slot rack system contains a rack power supply (1747-P1), a PLC processor on slot 0 (1747-L524), and a DeviceNet scanner module on slot 1 (1747-SDN), an 8 points input module on slot 2 (1746-IV8), and an 8 points output module on slot 3 (1747-OB8). (For further hardware and software configurations, please visit Allen Bradley website at http://www.ab.com/)

The 24vdc regulated power supply is powered the network BUS-(0vdc) and BUS+(24vdc) on DIP790 board. DIP790 is a DeviceNet distribution board with 1-inline & 6-outline connections. The DIP790 is connected to an AB 1747 DeviceNet scanner module, which is tapped into the DeviceNet network. Based upon Open DeviceNet Vendor Association, Inc. (ODVA) specification, the operational voltage ranges from 11~25 vdc. The nominal voltage is 24 vdc. (For more information on specifications, visit ODVA home page at www.odva.org.)

The AB 1747-PIC is a communication interface module, which uses RSLogic500 software to interface with a PC. RSLogic500 is a window based ladder logic software program. RSLogic500 enables the user to upload/download and monitor PLC data.

The AB 1770-KFD is a communication interface module, which enables the user to communicate between serial RS232 to DeviceNet network. The communication enables the user to setup, configure and access DeviceNet network information using RSLinx and RSNetWorx software.

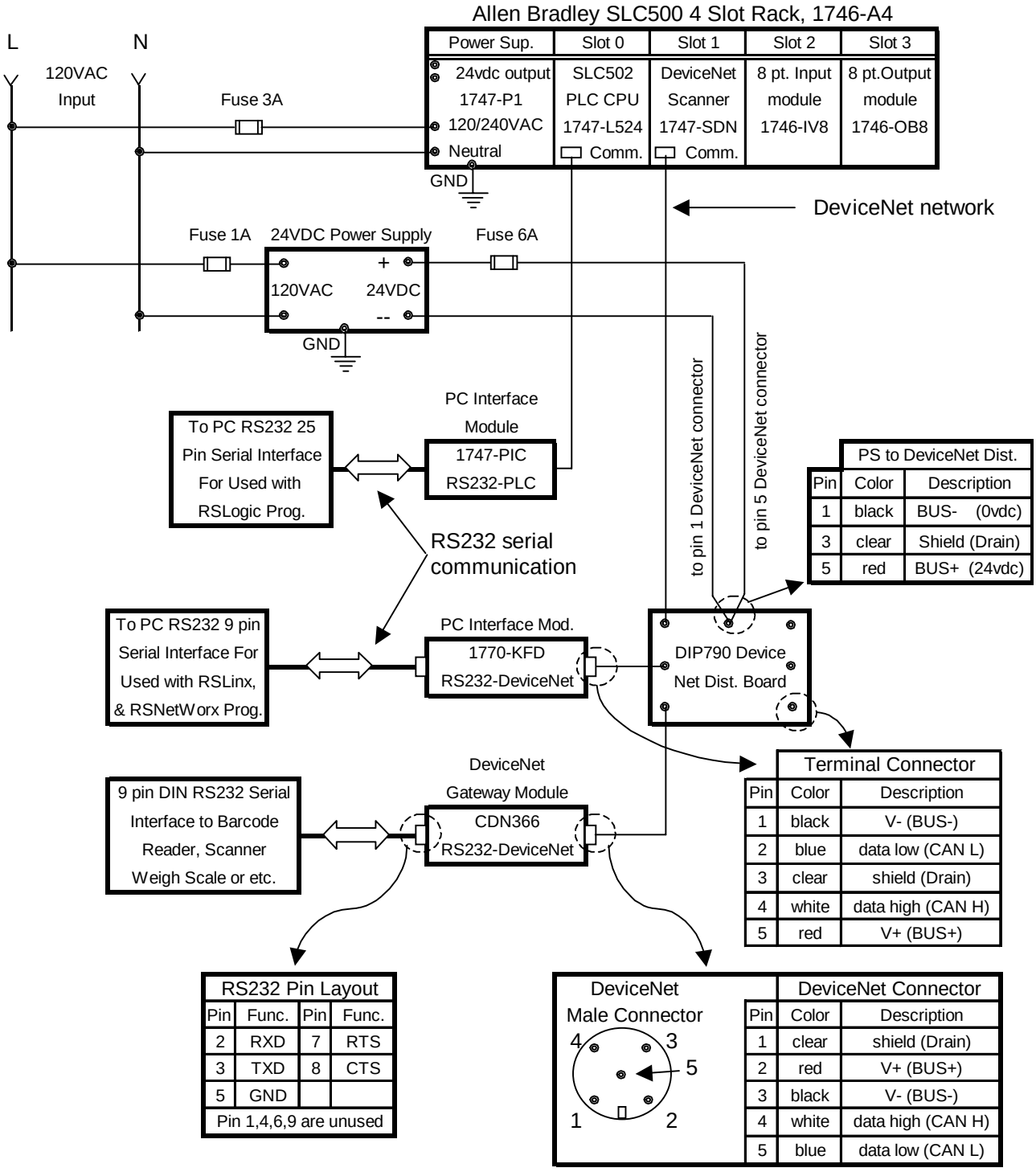
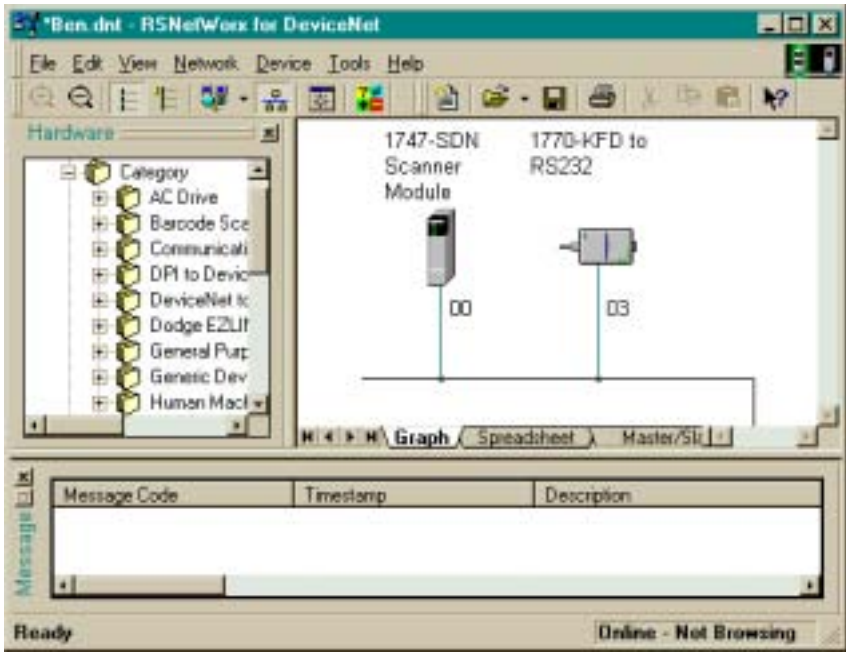


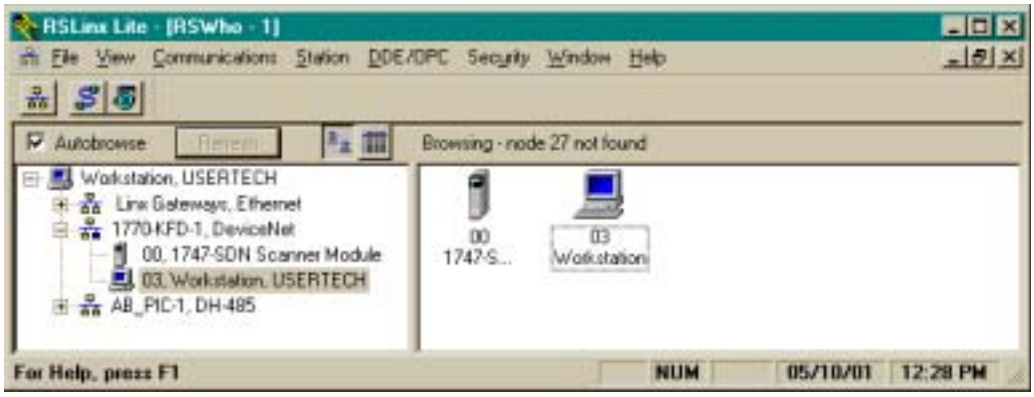
Figure 1. CDN366 Integrate with Allen Bradley SLC500

CDN366 Setup & Configurations:

Prior to the setup and configuration of the CDN366 device, the PLC hardware (power supply, CPU, DeviceNet scanner, I/O modules), software (RSLinx, RSNetWorx & RSLogic500) and interface modules must be setup and configured first. (For further information on setup and configuration of the Allen Bradley PLC controller, please visit www.ab.com)

In this particular example, the hardware and software were setup and configured based upon page 1 listing. The figures below demonstrate that the RSNLinx and RSNetWorx are running. The DeviceNet scanner module scanned the network and found node 00 (master DeviceNet scanner) and node 03 (slave interface module). It is recommended to setup the DeviceNet master scanner module to MAC-ID 00. The maximum number of nodes on the DeviceNet network is 64, with a MAC-ID ranges of 00~63.





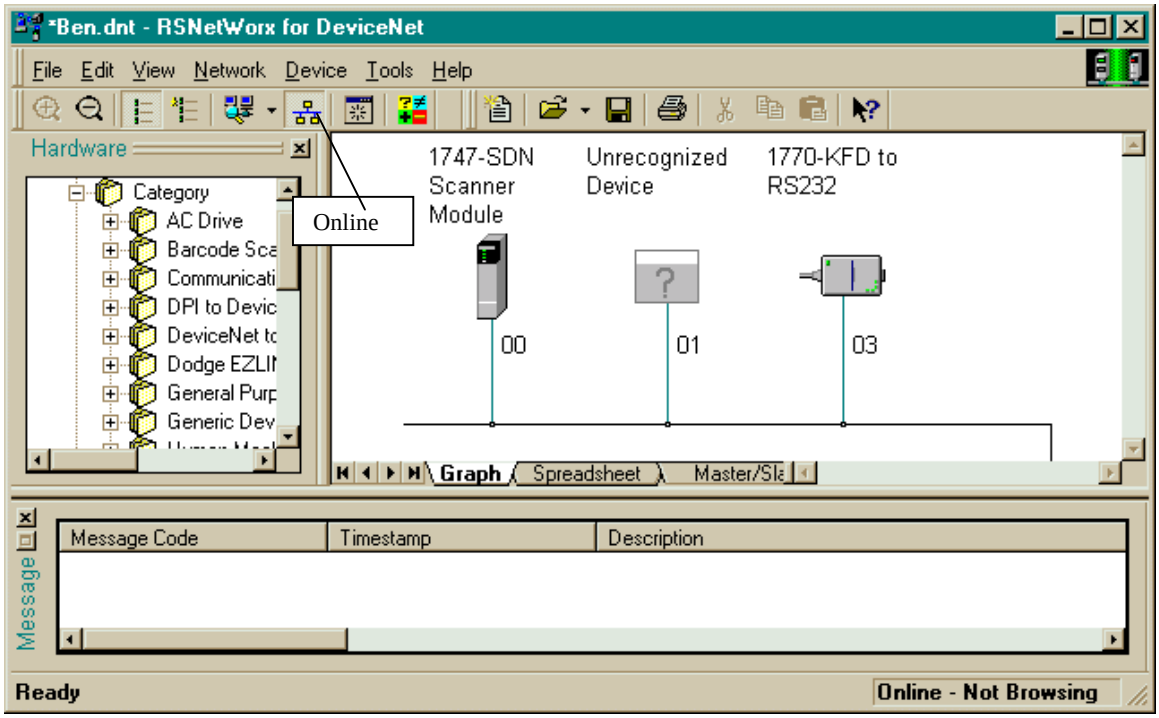
Register Electronic Data Sheet (EDS) File:

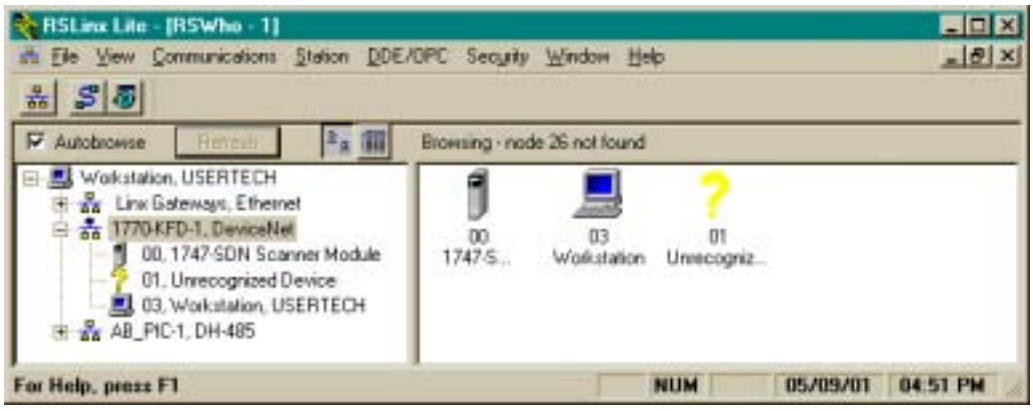
In order to integrate the CDN366 to DeviceNet network, the CDN366 must be set up and configured first. *CDN366 must be disconnected from the DeviceNet network before configuring the node address and baud rate.* Set the DeviceNet baud rate to match with the network baud rate. Set the Mac ID to an unused node address. The example below shows that the CDN366 was set at Mac ID 01 (MSD=0, LSD=1), and DeviceNet network baud rate is at 125Kb.

RS-232 9 pin DIN male connector
Connect to serial perhiphial

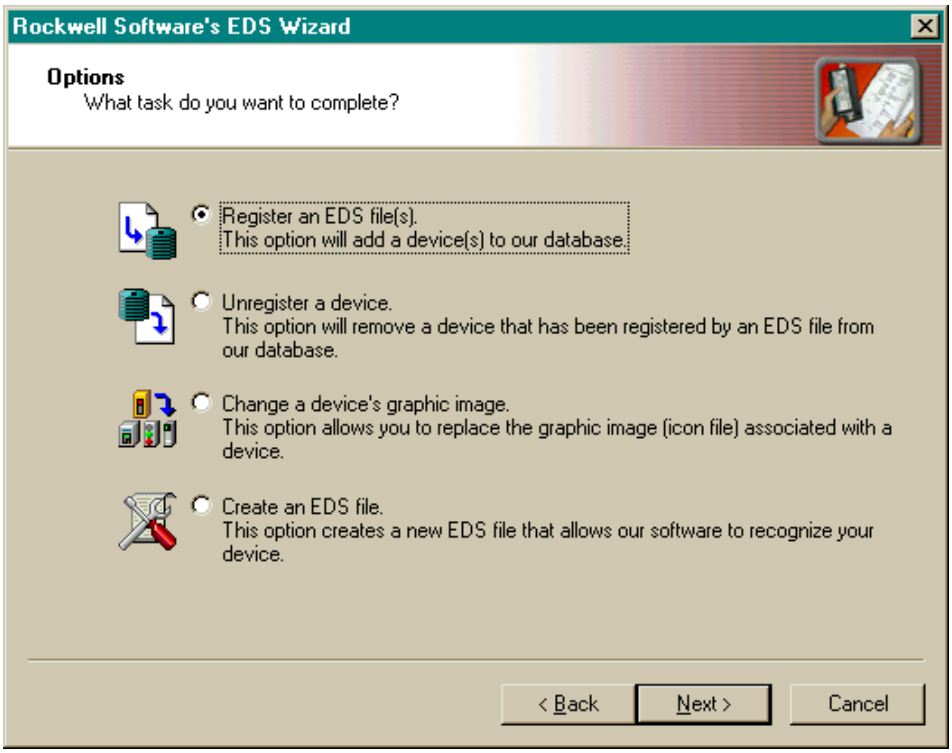
Micro-style male connector
5 pin to DeviceNet network

Connect the CDN366 to the DeviceNet network and click on the "network scan" (Online icon). The DeviceNet master will scan the network. The CDN366 is not registered. Therefore, RSLinx and RSNetworx do not recognize the device.

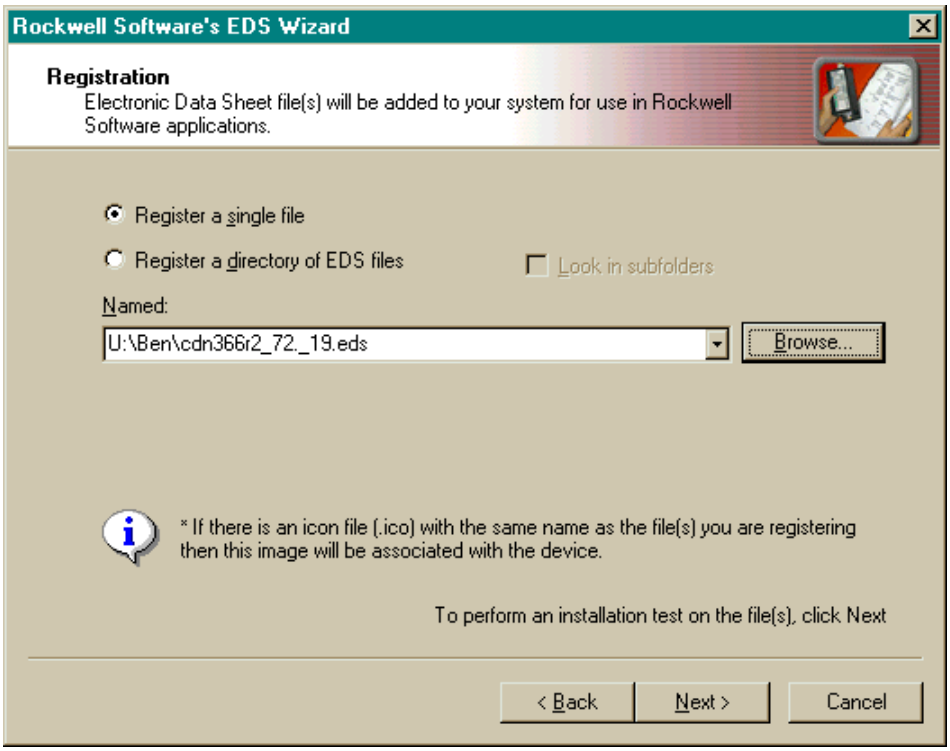




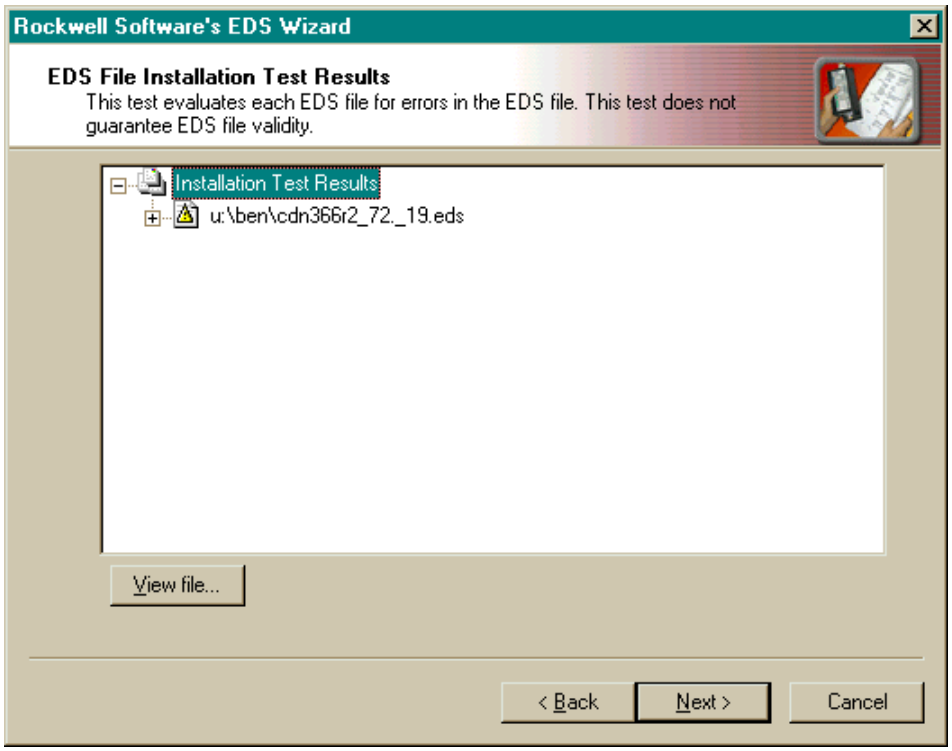
In order to register the CDN366 on RSNetWorx, click on "**Tools**" and select "**EDS Wizard**". Click on "**Next>**" and the "**Options**" menu is prompted.


Rockwell Software's EDS Wizard
Options
What task do you want to complete?
Register an EDS file(s).
This option will add a device(s) to our database.
Unregister a device.
This option will remove a device that has been registered by an EDS file from our database.
Change a device's graphic image.
This option allows you to replace the graphic image (icon file) associated with a device.
Create an EDS file.
This option creates a new EDS file that allows our software to recognize your device.
< Back
Next >
Cancel

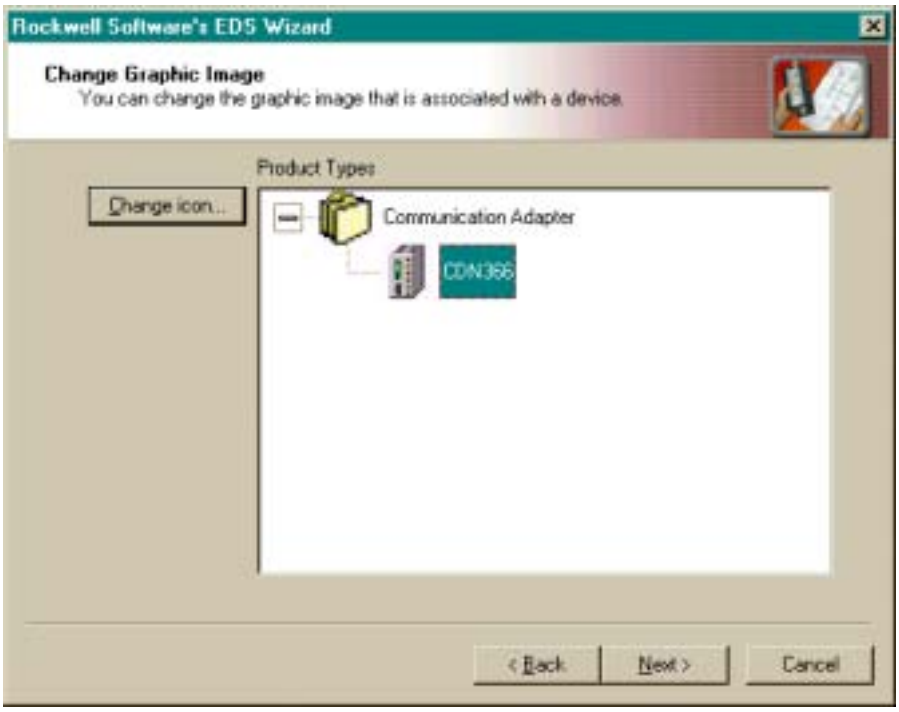
Select "**Register an EDS file(s)**" and click on "**Next>**"


Rockwell Software's EDS Wizard
Registration
Electronic Data Sheet file(s) will be added to your system for use in Rockwell Software applications.
Register a single file
Register a directory of EDS files
Look in subfolders
Named:
U:\Ben\cdn366r2_72._19.eds
Browse...
* If there is an icon file (.ico) with the same name as the file(s) you are registering then this image will be associated with the device.
To perform an installation test on the file(s), click Next
< Back
Next >
Cancel

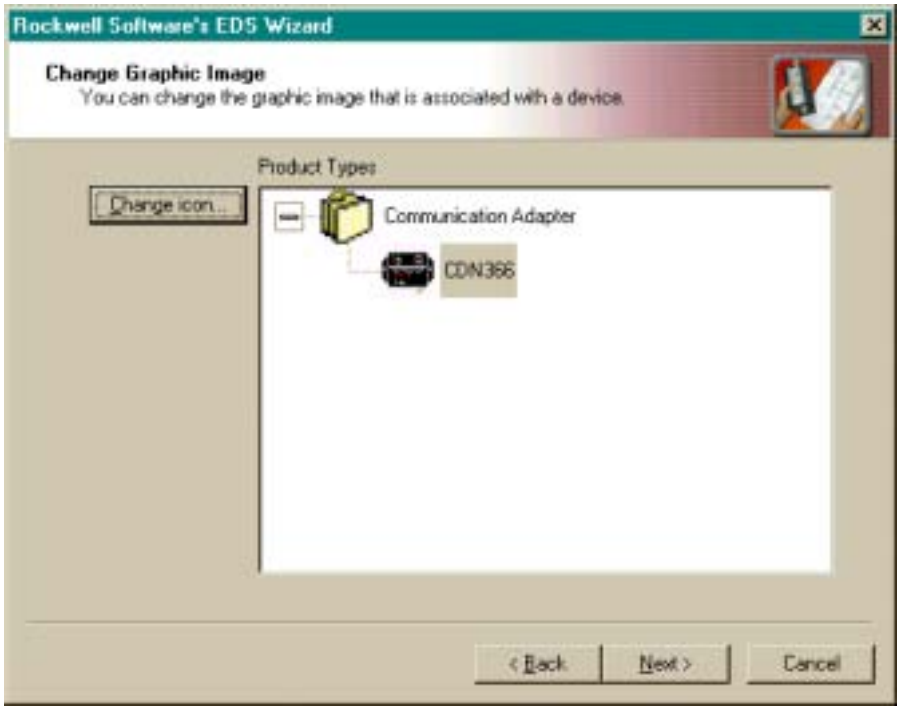
Select "**Register a single file**" and enter the EDS file name on the white box. Click on "**Next>**"


Rockwell Software's EDS Wizard
EDS File Installation Test Results
This test evaluates each EDS file for errors in the EDS file. This test does not guarantee EDS file validity.
Installation Test Results
u:\ben\cdn366r2_72._19.eds
View file...
< Back
Next >
Cancel

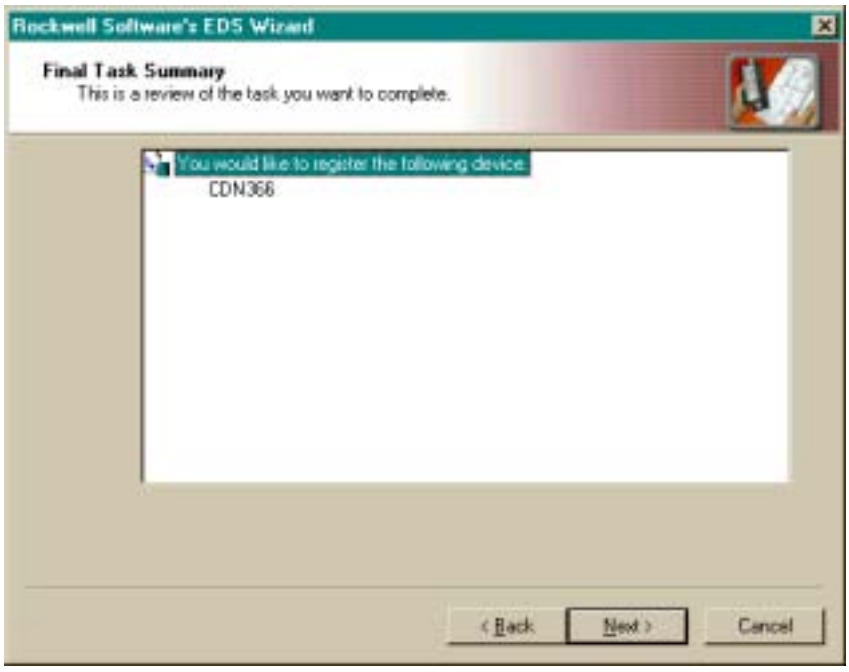
The "**EDS File Installation Test Results**" menu is prompted, click on "**Next>**". The "**Change Graphic Image**" menu is prompted. Select **CDN366** and click on "**Change icon**".



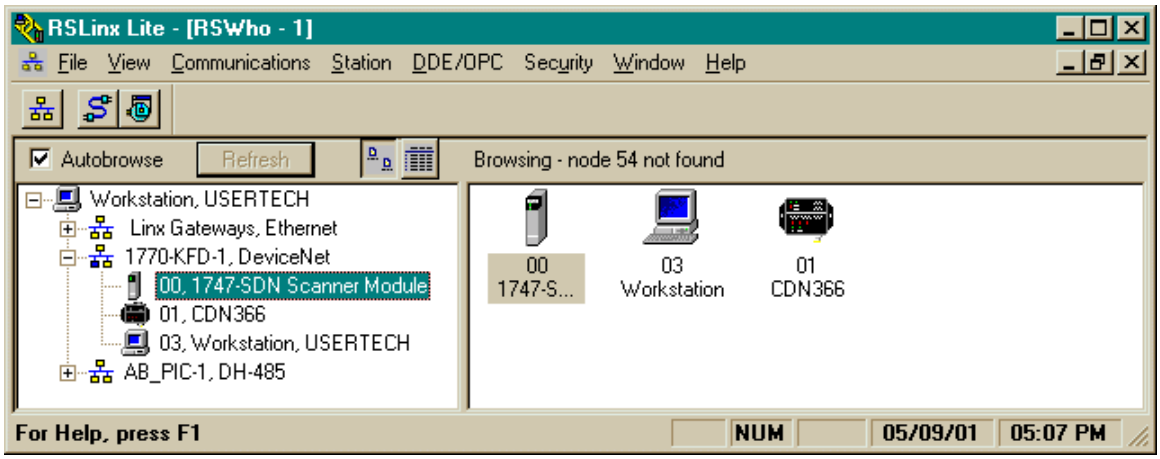
Select another icon to replace current CDN366 icon. Click "**OK**" to exit "**Change Icon**" menu. After it is changed to a new icon, click on "**Next**>".

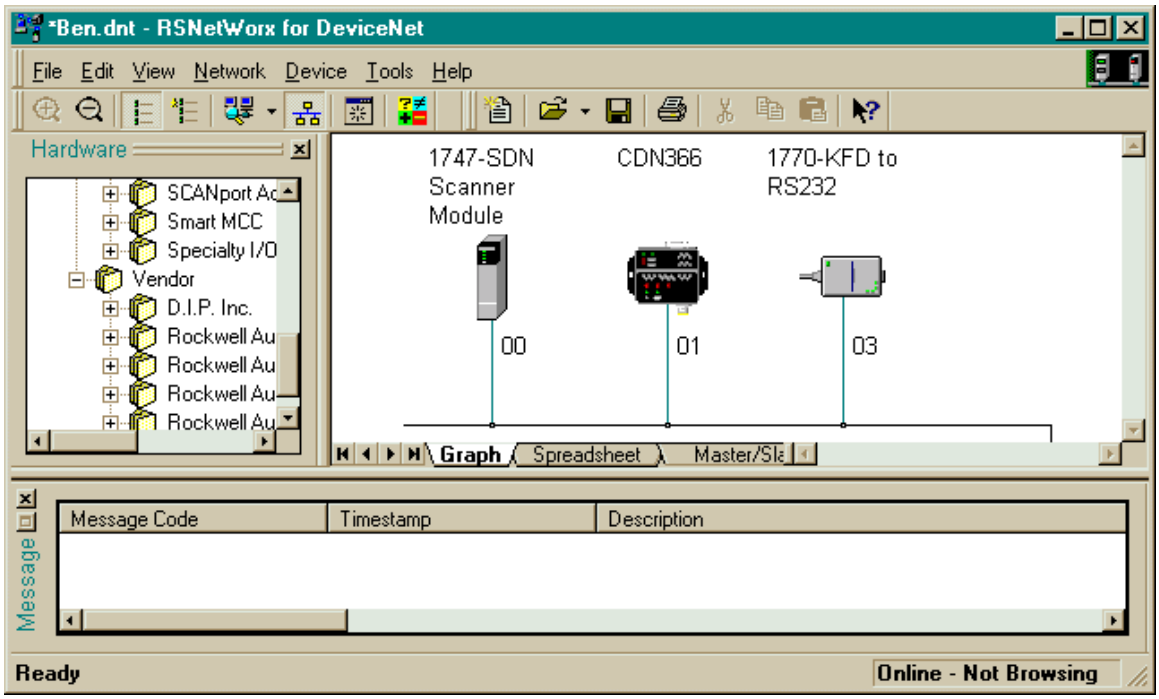


The "**Final Task Summary**" menu is prompted, click on "**Next>**"


Rockwell Software's EDS Wizard
Final Task Summary
This is a review of the task you want to complete.
You would like to register the following device:
CDN366
< Back
Next >
Cancel

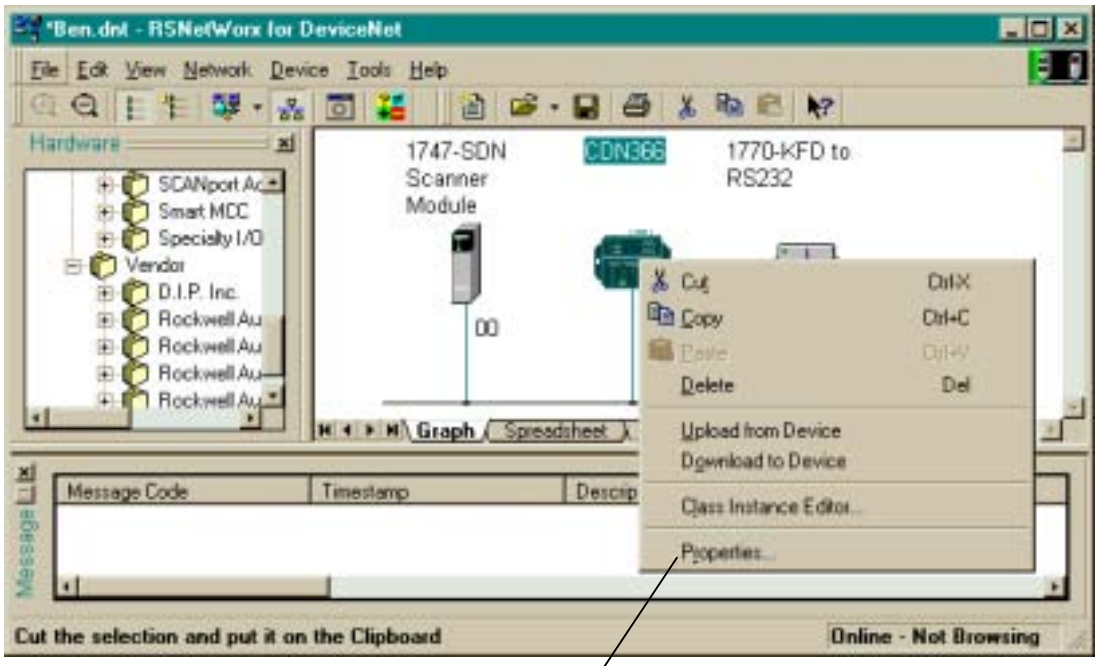
The "**Completing the EDS Wizard**" menu is prompted. Click on "**Finish**" to complete the EDS Wizard. On RSLinx and RSNetWorx, click on the "**Online**" icon to re-scan or browse the network. The CDN366 should be identified on the RSLinx and RSNetWorx network. *If after registering the EDS file, the CDN366 is unrecognized on the DeviceNet network (see the Troubleshooting Guide on page 35).*



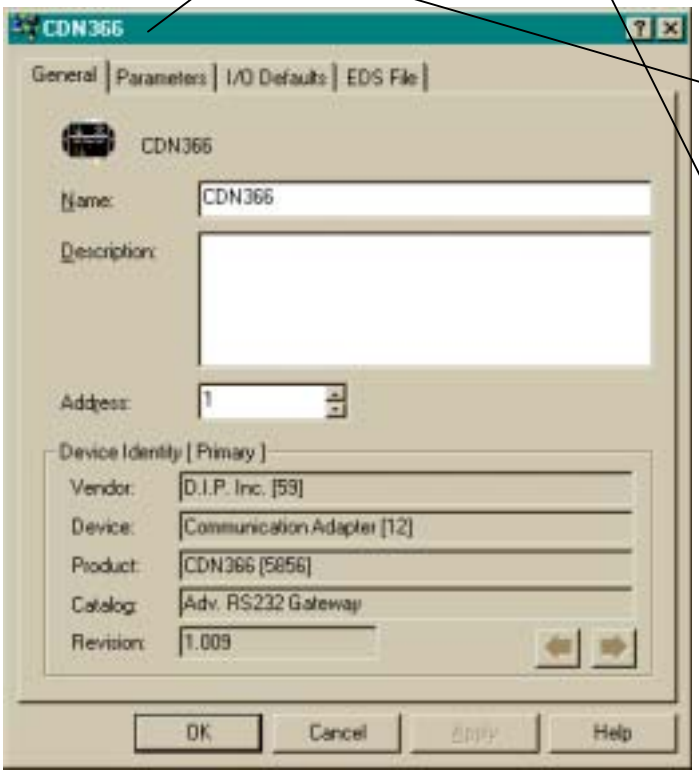


CDN366 Parameter Configuration:

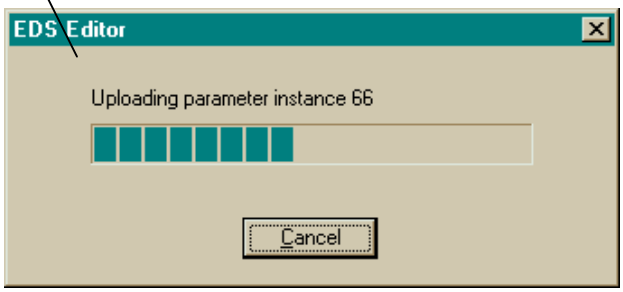
Now, the CDN366 is on the DeviceNet network. *To change the CDN366 parameters, ensure that the CDN366 device is not on the DeviceNet master scanlist*. To edit the parameters on CDN366, point the mouse to CDN366 icon and right click.

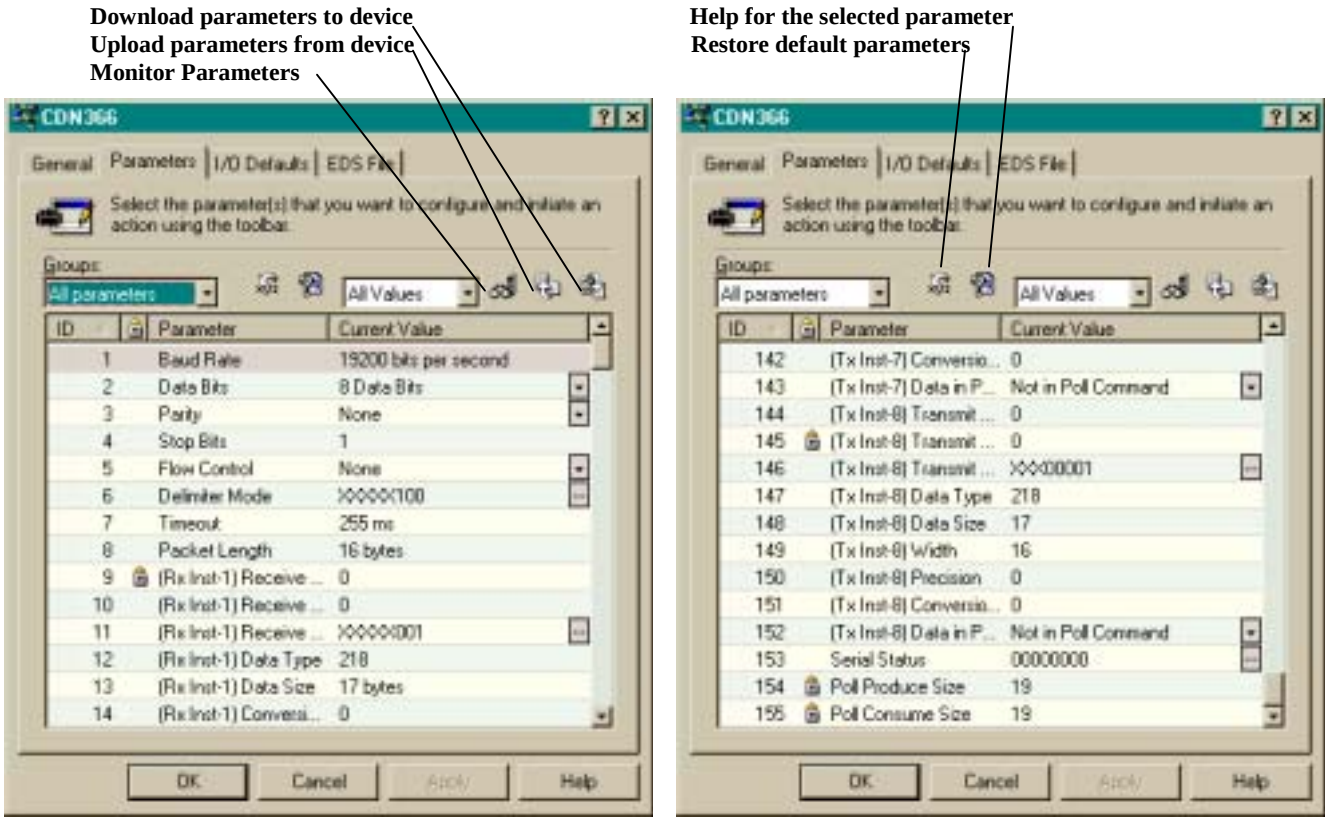


When the sub-menu is prompted, click on "**Properties**" and the "**CDN366**" menu appears. Select "**Parameters**", and the "**EDS Editor**" sub-menu is prompted. Click on "**Upload**", and the default parameters will upload from CDN366 device.

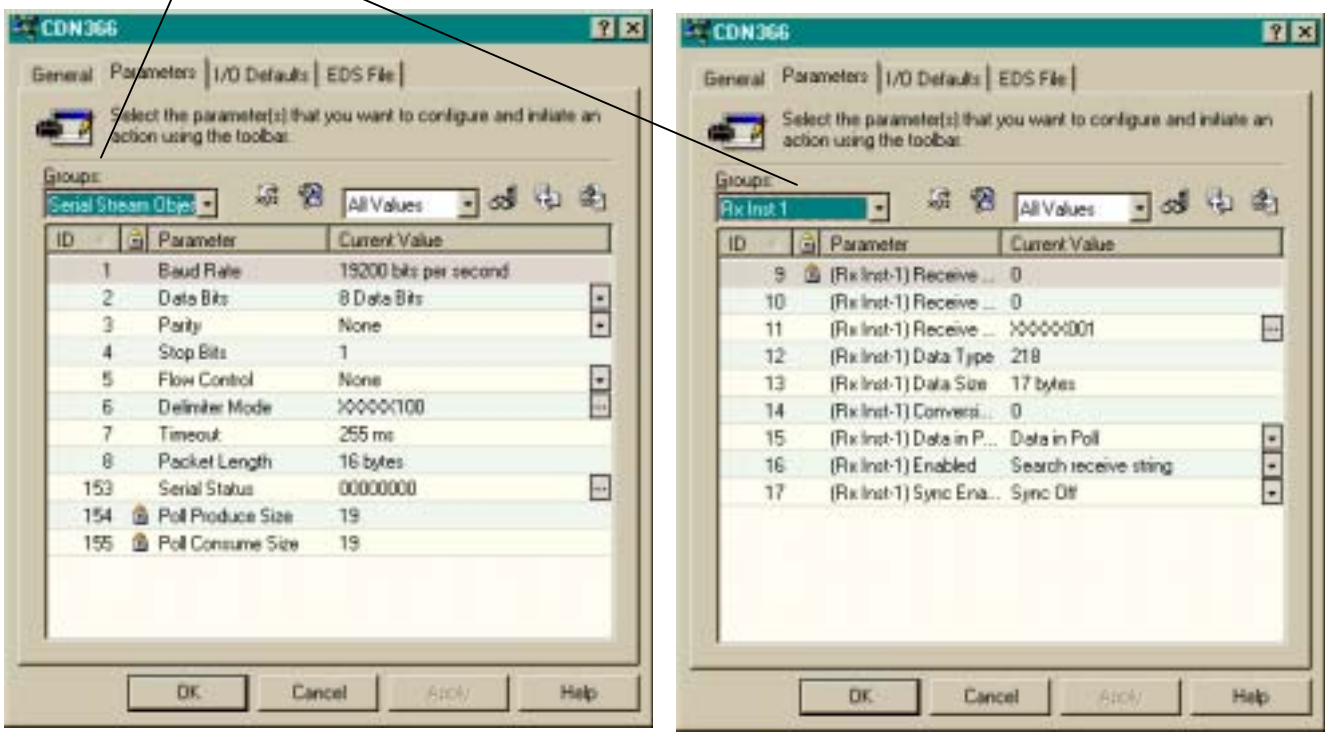


EDS Editor
Do you want to upload the configuration from the device, updating the software's configuration; or download the software's configuration to the device, updating the device?
For more information, press F1
Upload
Download
Cancel




Download parameters to device
Upload parameters from device
Monitor Parameters
Help for the selected parameter
Restore default parameters
CDN366
General
Parameters
I/O Defaults
EDS File
Select the parameter(s) that you want to configure and initiate an action using the toolbar.
Groups:
All parameters
All Values
ID
Parameter
Current Value
1 Baud Rate 19200 bits per second
2 Data Bits 8 Data Bits
3 Parity None
4 Stop Bits 1
5 Flow Control None
6 Delimiter Mode
7 Timeout 255 ms
8 Packet Length 16 bytes
9 (Rx Inst-1) Receive ... 0
10 (Rx Inst-1) Receive ... 0
11 (Rx Inst-1) Receive ...
12 (Rx Inst-1) Data Type 218
13 (Rx Inst-1) Data Size 17 bytes
14 (Rx Inst-1) Conversi... 0
142 (Tx Inst-7) Conversio... 0
143 (Tx Inst-7) Data in P... Not in Poll Command
144 (Tx Inst-8) Transmit ... 0
145 (Tx Inst-8) Transmit ... 0
146 (Tx Inst-8) Transmit ...
147 (Tx Inst-8) Data Type 218
148 (Tx Inst-8) Data Size 17
149 (Tx Inst-8) Width 16
150 (Tx Inst-8) Precision 0
151 (Tx Inst-8) Conversio... 0
152 (Tx Inst-8) Data in P... Not in Poll Command
153 Serial Status 00000000
154 Poll Produce Size 19
155 Poll Consume Size 19
OK
Cancel
Apply
Help

The CDN366 has eight (8) Rx/Tx instances. The total number of parameters are 155. On the "**Groups**" selection, click on the "down arrow key" and then select "**Serial Stream Object**", "**Rx Inst 1**" or "**Tx Inst 1**".


CDN366
General
Parameters
I/O Defaults
EDS File
Select the parameter(s) that you want to configure and initiate an action using the toolbar.
Groups:
Serial Stream Objec
Rx Inst 1
All Values
ID
Parameter
Current Value
1 Baud Rate 19200 bits per second
2 Data Bits 8 Data Bits
3 Parity None
4 Stop Bits 1
5 Flow Control None
6 Delimiter Mode
7 Timeout 255 ms
8 Packet Length 16 bytes
153 Serial Status 00000000
154 Poll Produce Size 19
155 Poll Consume Size 19
9 (Rx Inst-1) Receive ... 0
10 (Rx Inst-1) Receive ... 0
11 (Rx Inst-1) Receive ...
12 (Rx Inst-1) Data Type 218
13 (Rx Inst-1) Data Size 17 bytes
14 (Rx Inst-1) Conversi... 0
15 (Rx Inst-1) Data in P... Data in Poll
16 (Rx Inst-1) Enabled Search receive string
17 (Rx Inst-1) Sync Ena... Sync Off
OK
Cancel
Apply
Help

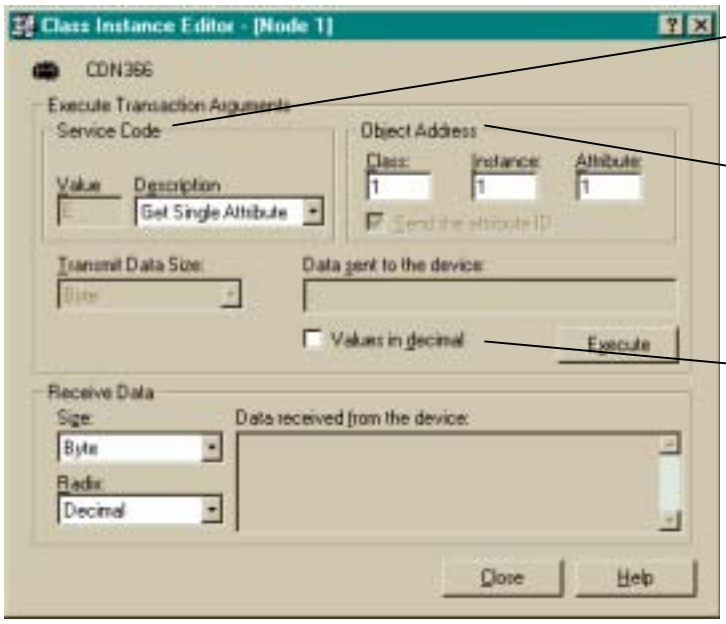
Change Parameter Setting Using RSNetWorx:

The CDN366 must be offline (not on Scanlist) to change any parameters. Some of the parameters cannot be change, but can be read (*see CDN366 DeviceNet Specifications for details*). Before making the parameter change, always upload the current parameters from the CDN366 device.

1) In the "**Parameters"** menu, double click on the parameter, and enter the new value. Then press "Enter" to accept the new value.
2) Click on "**Apply**" and click on "**Yes**" to download new changes to CDN366.

Another method for changing the parameters on CDN366 is using RSNetWorx.

1) Point mouse to CDN366 icon and right click. The sub menu is prompted.
2) Click on "**Class Instance Editor**", and the "WARNING!" alert menu is prompted.
3) Click on "**Yes**" to access the class instance editor menu.



Service Code: Used to verify or set new/current parameters for a single or a group of attributes.

Object Address: Enters a particular class, instance and attribute to verify or change parameter setting.

Set data in decimal or hexadecimal value.

Serial Stream Object Parameters (Class Code 64):

1) *Baud Rate:* The serial channel RS232 baud rate ranges from 300 ~ 57600 bits/sec. The acceptable baud rate are 300, 1200, 2400, 4800, 9600, 19200, 38400, and 57600. The baud rate should be set to match the serial connection.

2) *Data Bits:* The number of data bits can be selected at 7 or 8 bits. The data bits should be set to match the serial connection.

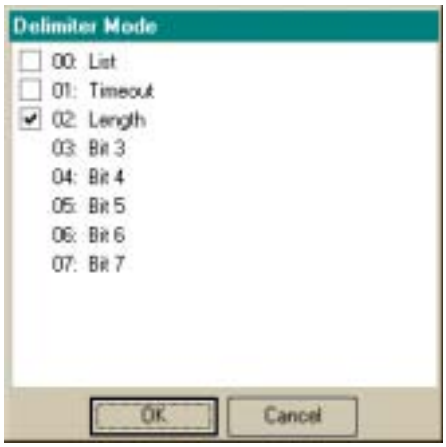
3) *Parity:* The parity bit can be selected at None, Odd, Even, Mark or Space. The parity bit should be set to match the serial connection.
   None = no parity
   Odd = parity bit =1, if there are odd number of one in data size
   Even = parity bit =1, if there are even number of ones data size.
   Mark = parity bit is 1 always
   Space = parity bit is 0 always
   In most applications, parity bit is set at None (no parity).

4) *Stop Bits:* The stop bits can be selected at 1 or 2. Each data byte (character) transmitted in a sequence is followed by 1 or 2 extra zero bits. The extra "0" is marked at the end of a character transmission. In most applications, the stop bit is set at 1. The stop bits should be set to match the serial connection.
   1 = Each data byte (character) transmit is followed by one zero (0).
   2 = Each data byte (character) transmit is followed by two zeros (0).

5) *Flow Control:* The flow control can be set at 0, 1, or 2. When flow control is set to 1, the X-Off (CTRL S) will force the CDN366's transmit function to block. The transmitted characters are stored in the FIFO buffer until transmission is re-enable by sending the X-On (CTRL Q) character to the CDN366. When the receive FIFO buffer is full, the X-Off character is transmitted to the RS232 interface. The X-On/ X-Off flow control characters are extracted from the data stream. Therefore, this setting is unsuitable for making binary data transmissions. When flow control is set to 2, the RTS (pin 7) and CTS (pin 8) control signals are enabled. The data is transmitted only when the CTS signal asserts a high/low voltage. When the receive FIFO buffer is not full, the RTS signal is asserted to allow data reception.
   0 = No flow control
   1 = X-On/X-Off flow control (software flow control)
   2 = CTS / RTS flow control (hardware flow control)

   In most applications, the flow control is set to 0 (no flow control).

6) *Delimiter Mode:* The delimiter is used to determine when the a complete packet is received from the RS232 side (see DeviceNet for further info.). There are three functions in delimiter mode: *List, Timeout and Length.*



List – select "List" when using the injunction with Pre and Post Short String data type format. The Pre/Post delimiters can be set in ASCII characters. Pre-delimiter is a character or list of characters (short string data type range 1~256 bytes) that trigger CDN366 to read the beginning of a data packet. Post-delimiter is a character or list of characters (short string data type range 1~256 bytes) that trigger CDN366 to read the end of a data packet.

Example: The data packet looks like this => [STX][Barcode data][ETX][CR]

STX (start of text) =ASCII 0x02, ETX (end of text) = ASCII 0x03,
CR (carriage return) = ASCII 0x13

STX= Pre-delimiter (Class=64, Instance=1, Attribute=11)
ETX + CR = Post-delimiter (Class=64, Instance=1, Attribute=12)

Setting Pre/Post delimiters: All values are in ASCII unit.
Pre-delimiter (Class=64, Instance=1, Attribute=11) = 01 02
Pos-delimiter (Class=64, Instance=1, Attribute=12) = 02 03 13

First byte is defined as bytes length in ASCII characters. The 01 is equivalent to 1 byte length, which is in Pre-Delimiter. The 02 is equivalent to 2 bytes length which is that set in Post-Delimiter.

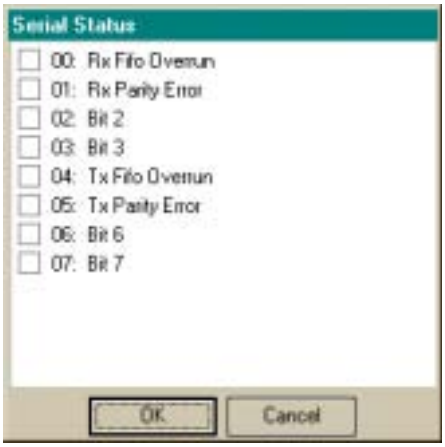
Timeout – When Timeout Delimiter is enabled, the value is set at Packet Timeout (Class=64, Instance=1, Attribute=13), which will delay the time to determine when a package is completed. The Packet Timeout value ranges from 1~255msec. A poll response message is sent, if either the Packet Length or Post Delimiter is not received within the time specified in the Packet Timeout.

Packet Timeout – Specifies the amount of time in milliseconds (1~255msec) between bytes that CDN366 uses to determine when the data packet is complete.

Length – When a value (byte range from 1~255) is set in the Packet Length, (Class=64, Instance=1, Attribute=14) the data packet is fixed based upon the Packet Length. As the data packet receives from a poll response, the data packet is complete as number of bytes sent is equal to the byte value set in Packet Length.

Packet Length – Specifies the number of bytes (1~255 bytes) to wait for before determining the data packet is complete.

7) *Serial Status:* The serial status indicates whether the serial Receive/Transfer on RS232 has errors. When an error has occurred in the serial status, a bit is set for the error. Set any of these bits to zero, and it will clear the particular error.

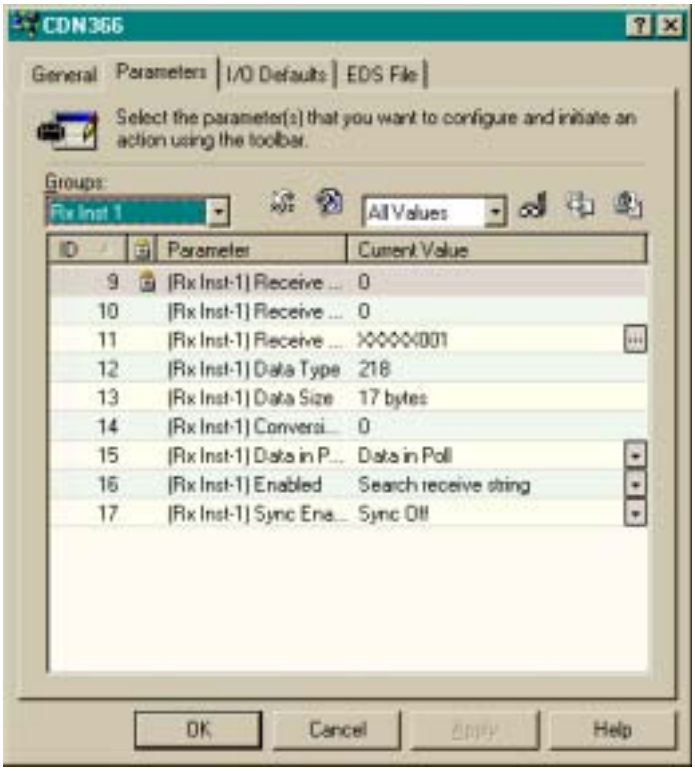


8) *Poll Produce Size:* This attribute can be accessed as read only. The produce size is defined as the number of Rx data bytes plus two handshaking bytes. One handshaking byte is for *Transmit Acknowledge*, which confirms the data transmitted in instances 1 to 8. Bit 0 is set for transmit acknowledge in Instance 1. Bit 1 is set for transmit acknowledge in Instance 2 and etc. The other handshaking byte is for the *Receive Toggle*, which toggle instances 1 to 8. Bit 0 is set for receive toggling in Instance 1. Bit 1 is set for receive toggling in Instance 2 and so on (see Serial Receive/Transmit & I/O Mapping section). When Poll I/O Connection is established with Allen Bradley 1747-SDN DeviceNet master scanner, the produce size number of bytes will map into discrete Input data memory or M file table.

9) *Poll Consume Size:* This attribute can be accessed as read only. When establishing a short string data type I/O connection, the produce size is defined as the number of Tx data bytes plus two handshaking bytes. One handshaking byte is for *Transmit Toggle* for instances 1~8. The other one handshaking byte is for *Receive Acknowledge* for instances 1~8, (see Serial Receive/Transmit & I/O Mapping section). When Poll I/O Connection is established with Allen Bradley 1747-SDN DeviceNet master scanner, the consume size bytes will map into discrete Output data memory or M file table.

Serial Receive Object Parameters (Class Code 65):

There are eight identical receive (Rx) instance parameters which can be set in CDN366. This section will review one of the eight receive instance parameters. These parameters can easily be changed using RSNetWorx. When using RSNetWorx to upload the parameters, first go to "**Groups**" and select "**Rx Inst 1**".



10) <u>*Receive Toggle*</u>: This parameter is read only. When new data has been received, bit 0 is toggle (see *Receive Handshaking & I/O Mapping*).

11) <u>*Receive Acknowledge:*</u> The value in this parameter ranges from 0~1 bit. In the poll response, this value must *match* with the *Receive Toggle* bit to receive new serial data on the DeviceNet. The Sync Enabled attribute must be enable when using this attribute (see *Receive Handshaking& I/O Mapping*).

12) <u>*Receive Mode:*</u> Bits 3~7 are unused (label Xs). When a bits 0~2 are set to 1, their function is enabled.

Receive Mode (class=65, instance=1, attribute=6)							
bit 7	**bit 6**	**bit 5**	**bit 4**	**bit 3**	**bit 2**	**bit 1**	**bit 0**
unused	unused	unused	unused	unused	Use Post	Use Pre	Use Data

<u>*Use Data (bit 0):*</u> Normally, this parameter bit is set to 1. When it is enabled, the packet data is extracted to transmit to DeviceNet.

<u>*Use Pre-String (bit 1):*</u> When this parameter bit is set to 1, the pre-string ASCII characters (bytes) will be removed before the PLC receives data from DeviceNet. Pre-string characters are the ASCII characters found before the serial data.

<u>*Use Post-String (bit 2):*</u> When this parameter bit is set to 1, the post-string ASCII characters (bytes) will be removed before the PLC receives data from DeviceNet. Post-string characters are the serial ASCII characters found after the data.

13) *Date Type:* When 194 or 198 is entered for Data Type (class=65, instance=1, attribute=9), then one byte will be allocated for Data Size (class=65, instance=1, attribute=10). When 195 or 199 is entered for Data Type, then two bytes will be allocated for Data Size. When 202 is entered for Data Type, then four bytes will be allocated for Data Size.

Decimal	Hex.	Data Type	Date Size (byte)	Value Range
194	0xC2	SINT (signed 8-bit integer)	1	-128 ~ 127
195	0xC3	INT (signed 16-bit integer)	2	-32768 ~ 32767
198	0xC6	USINT (unsigned 8-bit integer)	1	0 ~ 255
199	0xC7	UINT (unsigned 16-bit integer)	2	0 ~ 65535
202	0xCA	REAL (32-bit floating point value)	4	±1.175E-38 ~ ±3.4028E+38
218	0xDA	Short_String	Set by data size attribute, Max. 255 bytes	

The Short-String data type is used in most applications. Short-String data type is used to transfer serial data in ASCII format.

Example: When a barcode reader sent data, "12345678" to CDN366, CDN366 converted the numbers to DeviceNet signal and send it to PLC. In the PLC memory Input I/O table or M-file (must copy to N-integer to be able to view), the data received is listed as ASCII format "812345678" or Hex format "38 31 32 33 34 35 36 37 38".

14) *Data Size:* The data size (class=65, instance=1, attribute=10) is settable only if the Data Type (class=65, instance=1, attribute=9) is Short-String. The maximum number of ASCII characters (bytes) is 256.

15) *Width:* This attribute is not applicable for Short-String data type. The maximum settable width (class=65, instance=1, attribute=11) for a real or integer data type is 16.

Example: In order to receive a real value as "-1.2345E-16", the width should be set to at least 11. When the width is set to 7, the received real value is "-1.2345".

16) *Conversion:* The conversion (class=65, instance=1, attribute=13) is valid only when the Data Type is an integer type. The conversion can convert from hexadecimal (X) to decimal (d) or vice versa. The attribute is settable to "D"=0x44 (Hex.) for decimal and "X"=0x58 (Hex.) for hexadecimal.

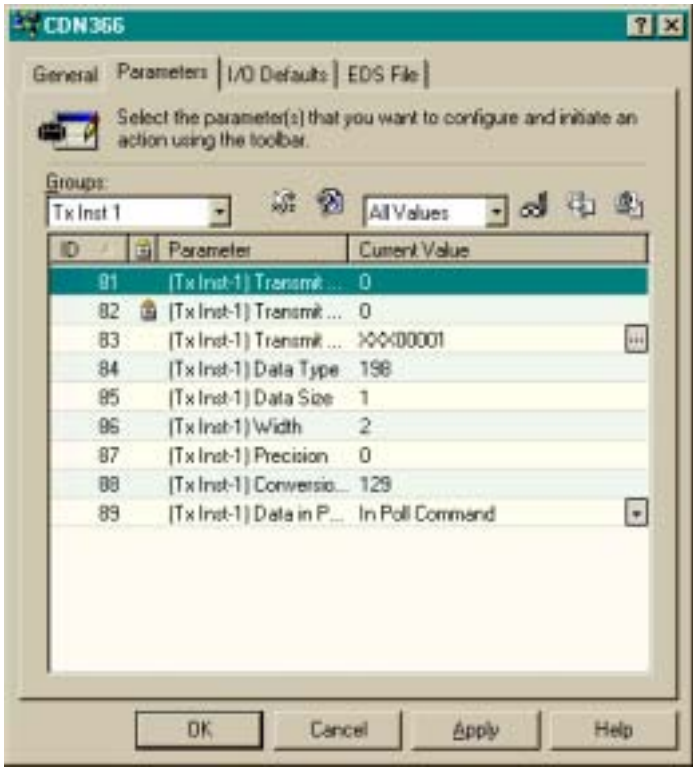
17) *Data In Poll Response:* When data in the poll response is set to 1 (enable), the Receive Data packet (bytes) of a particular instance is added in the CDN366's Poll Response. Any particular Rx instances, which are unused, must be disabled. The data in the poll response attribute must be enabled to establish an I/O connection with the master scanner (see Input Memory Table of A-B 1747-SDN mapping).

18) Enable: When the enable search receive string is set to 1, the current instance will be used to process the incoming receive message (packet) to extract the data specified in Data Type. This attribute should be disabled for all unused instances.

19) Sync Enabled: When sync enable is set to 1, the CDN366 will not respond with new serial data until the value in the Receive Acknowledge bit has been toggled. Enabling this attribute ensures that the master scanner module does not miss data between polls.

Serial Transmit Object Parameters (Class Code 66):

There are eight replicate independent transmit (Tx) instances, which can be set in CDN366. This section is using RSNetWorx to review one of eight transmit instances in CDN366.

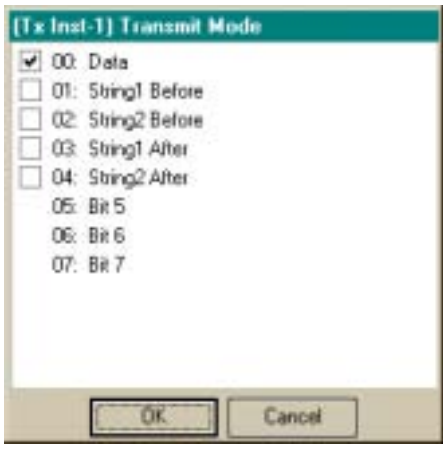


20) Transmit Toggle: The transmit toggle byte for 8 instances are mapped to 1747-SDN Output I/O table. Instance 1 transmit toggle is bit 0. Bit 0, one of the eight bits, which toggles between 0 & 1. When bit 0 is toggled, the data is sent out to RS232 side of CDN366 (see *Transmit Handshaking & I/O Mapping*).

21) Transmit Acknowledge: The transmit acknowledge byte for 8 instances are mapped to 1747-SDN Input I/O table. The information can be accessed as read only. Instance 1 transmit acknowledge is bit 0. Bit 0, one of the eight bits, which toggles between 0 & 1. When bit 0 is toggled, data has been transmitted (see *Transmit Handshaking & I/O Mapping*).

Note that Tx Ack., Tx toggle, Rx Ack., and Rx Toggle are attributes used in the poll command and poll response to control the serial/DeviceNet data transfer and do not need to be set explicitly as part of the CDN366 setup.

22) <u>Transmit Mode:</u> (class=66, instance=1, attribute=6) Bits 5~7 are unused. The transmit mode is used for transmitting the data in conjunction with strings before and/or after data. The *String1* (class=66, instance=1, attribute=7) is a list of ASCII characters (bytes) to be transmitted. The *String2* (class=66, instance=1, attribute=8) is a list of ASCII characters (bytes) to be transmitted.



Example: Set String1 to start of text (STX) and String2 to end of text (ETX) with carriage return (CR).

In the ASCII table, STX is 0x01, ETX is 0x03 and CR is 0x13 in hex.

Format: String1 = [length in characters (bytes)][char.1] [char.2] … [char.9]

Format: String2 = [length in characters (bytes)][char.1] [char.2] … [char.9]
String1 and String2 each can be set a at max. of nine (9) ASCII char. (bytes).

String1 = STX = 01 02 (01 is one char. length, 02 is STX in ASCII).
String2 = ETX + CR = 02 03 13 (02 is two char. length, 03 is ETX & 13 is CR in ASCII).

Example: Set *String1 Before* data and *String2 After* data.

Format: [String1 Before][String2 Before][Data][String1 After][String2 After]

[String1 Before] [Data] [String2 After] = [STX] [Data] [ETX + CR]

23) <u>Data Type:</u> When 194 or 198 is entered for Data Type (class=66, instance=1, attribute=9), one byte will be allocated for Data Size (class=66, instance=1, attribute=10). When 195 or 199 is entered for Data Type, two bytes will be allocated for Data Size. When 202 is entered for Data Type, four bytes will be allocated for Data Size.

Decimal	Hex.	Data Type	Date Size (byte)	Value Range
194	0xC2	SINT (signed 8-bit integer)	1	-128 ~ 127
195	0xC3	INT (signed 16-bit integer)	2	-32768 ~ 32767
198	0xC6	USINT (unsigned 8-bit integer)	1	0 ~ 255
199	0xC7	UINT (unsigned 16-bit integer)	2	0 ~ 65535
202	0xCA	REAL (32-bit floating point value)	4	±1.175E-38 ~ ±3.4028E+38
218	0xDA	Short_String	Set by data size attribute, Max. 255 bytes	

24) *Data Size:* The data size (class=66, instance=1, attribute=10) is settable only if the Data Type (class=66, instance=1, attribute=9) is Short-String.

25) *Width:* This attribute is not applicable for Short-String data type. When *Width* value (bytes) is set greater than the size (bytes) of the converted value, the Tx Leading Zeros (class=66, instance=1, attribute=11) bit will pad 0's in front of the data (see examples below).

Data	Width	Precision	Leading Zeros	Result
4.75	8	2	enabled	00004.75
4.75	8	3	enabled	0004.750
4.75	8	2	disabled	4.75
4.75	8	4	disabled	4.7500
4.75	8	1	enabled	000004.8

26) *Precision:* (class=66, instance=1, attribute=12) Specifies the number of places after the decimal point that are transmitted. This attribute applies only to the Real data type. The maximum number of decimal points is six (6).

27) *Conversion:* (class=66, instance=1, attribute=13) Bits 1~5 are unused. When bit 0 is set to 1, the transmitted integer value will be converted to hexadecimal. When bit 0 is set to 0, the transmitted integer value will be converted to decimal. Bit 7 is set to 1 to enable Leading Zeros. When Leading Zero is enabled, the zeros are padded in front of the data.

Conversion (class=66, instance=1, attribute=13)									
bit 7	**bit 6**	**bit 5**	**bit 4**	**bit 3**	**bit 2**	**bit 1**	**bit 0**		
Leading Zero	unused	unused	unused	unused	unused	unused	Hex	Conversion Options	
								Decimal	Hex.
1							1	129	0x81
1							0	128	0x80
0							1	1	0x01
0							0	0	0x00

28) *Data in Poll Command:* (class=66, instance=1, attribute=15) When data in the poll command is set to 1 (enabled), the Transmit Data packet (bytes) of a particular instance is added to the Poll Consume Size. Any particular Tx instances, which are unused must be disabled (Not in Poll Command.) The data in the poll command attribute must be enabled in order to establish an I/O connection with the master scanner (see Output Memory Table of A-B 1747-SDN mapping.)

Serial Receive/Transmit & I/O Mapping:

The Input words data memory table in 1747-SDN master scanner module ranges from I:1.0 ~ I:1.31. The Output words data memory table range from O:1.0 ~ O:1.31. The 1747-SDN can store 31 words or 62 bytes of serial receive or transmit data. Words I:1.0 & O:1.0 are reserved for the data block transfer between the 1747-SDN master scanner and the PLC processor unit.

M-File input mapping is similar to discrete input memory mapping. M-file input table in 1747-SDN master scanner module ranges from M1:1.0 ~ M1:1.149 words. The output table ranges from MO:1.0~MO:1.149 words. Total is 150 words or equivalent to 300 bytes for each input and output I/O mapping. The serial data sent or received by the CDN366 cannot be viewed on the M-file. M-file does not exist in data memory table. The serial data in the M-file must be copied to a N integer file in order to be able to view the data.

Receive Handshaking & I/O Mapping:

The *Receive Toggle* byte for instances 1~8 is mapped in Input word I:1.1 word bits 8~15. Each receive toggle bit is controlled by a single instance of receive object. When Instance 1 is used for serial reception, bit 8 at Input I:1.1 would be used for receive toggle bit. Bit 9 would be use for receive toggle bit for instance 2. Bit 14 would be use for receive toggle bit for instance 7. The input M-File mapping is similar to discrete input mapping.

	Receive Toggle bits 8~15 (1 byte)								**Transmit Acknolwedge bits 0~7 (1 byte)**							
	15	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
I:1.1	Inst. 8	Inst. 7	Inst. 6	Inst. 5	Inst. 4	Inst. 3	Inst. 2	Inst. 1	Inst. 8	Inst. 7	Inst. 6	Inst. 5	Inst. 4	Inst. 3	Inst. 2	Inst. 1

	Receive Acknowledge bits 8~15 (1 byte)								**Transmit Toggle bits 0~7 (1 byte)**							
	15	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
O:1.1	Inst. 8	Inst. 7	Inst. 6	Inst. 5	Inst. 4	Inst. 3	Inst. 2	Inst. 1	Inst. 8	Inst. 7	Inst. 6	Inst. 5	Inst. 4	Inst. 3	Inst. 2	Inst. 1

The *Receive Acknowledge* byte for instances 1~8 are mapped in Output O:1.1 word bits 8~15. The receive acknowledge bits are configured similar to the receive toggle bits. Each receive acknowledge bit represents a single instance of the receive object. When Instance 4 is used for serial reception, bit 11 at Output O:1.1 would be used for acknowledging the message received. Bit 11 would

toggle from 0 to 1. The output M-File mapping is similar to discrete inputs mapping.

When the short-string data type is used in instance 1, the *Receive Data Size* located in Input I:1.2 word bits 0~7. The *Receive Data Size* indicates the number of ASCII data bytes received from the RS232 serial connection by the CDN366. When RS232 serial data is received, the CDN366 counts the total ASCII data characters (bytes) in the message packet and places the value in starting at word I:1.2, bits 0~7. The ASCII characters (bytes) data received by the CDN366 are mapped onto words I:1.2 ~ I:1.31 (depending on the data size.) Each ASCII character is equivalent to *one byte*. Two bytes are equivalent to *one word*. The orders of the characters are mapped from right (least significant byte) to left (most significant byte) (see Input Memory and Input M-File Tables of Allen Bradley 1747-SDN).

To use both the *Receive Toggle* & *Receive Acknowledge* bits to control serial messages received by the CDN366 to the PLC input memory, the "Sync Enable" (class=65, instance=1, attribute=17) attribute must be "On". The "Sync On" requires the PLC ladder logic to control the handshaking bits to acknowledge newly received data before subsequent data can be received. The following discusses the "Rx Instance 1" reception.

1) Bit 0s are set to 0 at initial setting for Rx Instance 1 *Receive Toggle* and *Receive Acknowledge*. When data is received on the RS232 serial, the *Receive Toggle* bit 8 in input I:1.1 (Rx instance 1) is toggled from 0 to 1. The first byte of the received data is the data size length, which is stored in Input I:1.2 bits 0~7. The data is stored in Input I:1.2 bits 8~15 and so on (see Input Memory Table of Allen Bradley)

2) To acknowledge that data was received by the PLC, the *Receive Acknowledge* bit 8 on Output O:1:1 must toggle from 0 to 1. To do this, the PLC must use ladder logic to copy *Receive Toggle* bit 8 to *Receive Acknowledge* bit 8. As long as the *Receive Toggle* and *Receive Acknowledge* bits are the same, the CDN366 can update with the next serial message.

3) When the *Receive Acknowledge* bit 8 is not toggled to acknowledge that new data is received, the CDN366 will continue to hold newer serial data in the Rx FIFO until the buffer overflows.

When the "Sync Enable" is disabled, the *Receive Acknowledge* bits 8~15 serve no purpose, even when they are toggled. The new data sent from RS232 serial to PLC input memory cannot be controlled by *Receive Acknowledge* bits although a value must be present. *Receive Toggle* bit 8 (Rx Instance 1) is toggled for every new message it receives. The message data will be stored in the same PLC Input memory location until the new message is received and the existing message is replaced.

Example: The table below shows a short string data type with two receive instances that are mapped into discrete/M-file Inputs I/O. Each instance is

allocated for three characters (bytes) for serial receive. The total is ten bytes for PLC I/O mapping.

Input Memory Table of Allen Bradley 1747-SDN DeviceNet Master Scanner Module

Data Memory Table	1 Word Addressing I/O															
	1 byte = 8 bits								1 byte = 8 bits							
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
I:1.0	**Reserved Read-Only**															
I:1.1	Receive (Rx) Toggle: bits 8~15 Inst1=bit8, Inst2=bit9, .., Inst8=bit15								Transmit (Tx) Acknowledge: bits 0~7 Inst1=bit0, Inst2=bit1, .., Inst8=bit7							
I:1.2	Instance 1: Receive ASCII Character 1								Instance 1: Receive Data Size (length)							
I:1.3	Instance 1: Receive ASCII Character 3								Instance 1: Receive ASCII Character 2							
I:1.4	Instance 2: Receive ASCII Character 1								Instance 2: Receive Data Size (length)							
I:1.5	Instance 2: Receive ASCII Character 3								Instance 2: Receive ASCII Character 2							
: :	:								:							
I:1.31	:								:							

M-File Input Table of Allen Bradley 1747-SDN DeviceNet Master Scanner Module

Data Memory Table	1 Word Addressing I/O															
	1 byte = 8 bits								1 byte = 8 bits							
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
I:1.0	**Reserved Read-Only**															
I:1.1	Receive (Rx) Toggle: bits 8~15 Inst1=bit8, Inst2=bit9, .., Inst8=bit15								Transmit (Tx) Acknowledge: bits 0~7 Inst1=bit0, Inst2=bit1, .., Inst8=bit7							
M1:1.0	Instance 1: Receive ASCII Character 1								Instance 1: Receive Data Size (length)							
M1:1.1	Instance 1: Receive ASCII Character 2								Instance 1: Receive ASCII Character 3							
M1:1.2	Instance 2: Receive ASCII Character 1								Instance 2: Receive Data Size (length)							
M1:1.3	Instance 2: Receive ASCII Character 2								Instance 2: Receive ASCII Character 3							
: :	:								:							
M1:1.149	:								:							

Transmit Handshaking & I/O Mapping:

The *Transmit Toggle* byte for instances 1~8 are mapped in Output O:1.1 word bits 0~7. Each transmit toggle bit represents each instance. When transmit Instance 1 is completed from DeviceNet to RS232 serial transmission, bit 0 at Output O:1.1 toggles from 0 to 1. Instances 2~8 are similarly mapped to bits 1~7.

The *Transmit Acknowledge* byte for instances 1~8 is mapped in Input I:1.1 word bits 0~7. Each transmit acknowledge bit corresponds to an instance of the transmit object. When data is sent from PLC to the RS232 serial connection, the Input I:1.1 bit 0 (Instance 1) toggles when the data is transmitted by the CDN366. Bit 0 toggles between 0 and 1. Instances 2~8 are setup similarly mapped to bits 1~7.

	Receive Toggle bits 8~15 (1 byte)								Transmit Acknolwedge bits 0~7 (1 byte)							
	15	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
I:1.1	Inst. 8	Inst. 7	Inst. 6	Inst. 5	Inst. 4	Inst. 3	Inst. 2	Inst. 1	Inst. 8	Inst. 7	Inst. 6	Inst. 5	Inst. 4	Inst. 3	Inst. 2	Inst. 1

	Receive Acknowledge bits 8~15 (1 byte)								Transmit Toggle bits 0~7 (1 byte)							
	15	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
O:1.1	Inst. 8	Inst. 7	Inst. 6	Inst. 5	Inst. 4	Inst. 3	Inst. 2	Inst. 1	Inst. 8	Inst. 7	Inst. 6	Inst. 5	Inst. 4	Inst. 3	Inst. 2	Inst. 1

When the short string data type is used for instance 1, the *Transmit Data Size* is located in Output O:1.2 word bits 0~7. The *Transmit Data Size* indicates the number of ASCII data bytes to be transmitted from DeviceNet to the RS232 serial side. Enter a number in Output O:1.2, bits 0~7 to represent how many ASCII data characters (bytes) are to be transmitted (excluding the pre and post strings). The orders of the characters are mapped from right (least significant byte) to left (most significant byte). For the data size number of bytes, the first character starts word O:1.2 at bits 0~7 (see Output Memory and Output M-File Tables of Allen Bradley 1747-SDN).

When sending data using the *Transmit Toggle* and *Transmit Acknowledge* (bit 0 for Tx Instance 1) the following steps should be performed.

1) The initial setting for *Transmit Toggle* Output word O:1.1, bit 0 is 0. In order to send ASCII data out to the RS232 serial connection, the *Transmit Toggle* bit 0 must toggle from 0 to 1.
2) Specify the number of characters (bytes) to be transmitted. This transmit data size must be entered in Output word O:1.2, bits 0~7.
3) Enter the ASCII data in the Output memory table, starting in Word O:1.1, bits 8~15 to be transferred to RS232 side (see Output Memory and Output M-File Tables of Allen Bradley 1747-SDN for characters arrangement).
4) The *Transmit Toggle* bit 0 must toggle from 0 to 1 to transmit data for Tx Instance 1. The PLC ladder logic program must toggle this bit.
5) When data is transmitted to RS232, *Transmit Acknowledge* Input word I:1.1, bit 0 will toggle from 0 to 1. Indicate that transmit toggle can toggle to 0 to send new data. For numerical data (Real, Usint, etc.) there is no length byte, only the fixed number of data-size, and data bytes follow the handshaking bytes.

Example: The table below shows a short string data type with two transmit instances that are mapped into discrete/M-file Outputs I/O. Each instance is allocated for three characters (bytes) for serial transmit. The total is ten bytes for the PLC I/O mapping.

Output Memory Table of Allen Bradley 1747-SDN DeviceNet Master Scanner Module

Data Memory Table	1 Word Addressing I/O															
	1 byte = 8 bits								1 byte = 8 bits							
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
O:1.0	**Reserved Read-Only**															
O:1.1	Receive (Rx) Acknowledge: bits 0~7 Inst1=bit8, Inst2=bit9, .., Inst8=bit15								Transmit (Tx) Toggle: bits 0~7 Inst1=bit0, Inst2=bit1, .., Inst8=bit7							
O:1.2	Instance 1: Transmit ASCII Character 1								Instance 1: Transmit Data Size (length)							
O:1.3	Instance 1: Transmit ASCII Character 3								Instance 1: Transmit ASCII Character 2							
O:1.4	Instance 2: Transmit ASCII Character 1								Instance 2: Transmit Data Size (length)							
O:1.5	Instance 2: Transmit ASCII Character 3								Instance 2: Transmit ASCII Character 2							
: :	:								:							
O:1.31	:								:							

M-File Output Table of Allen Bradley 1747-SDN DeviceNet Master Scanner Module

Data Memory Table	1 Word Addressing I/O															
	1 byte = 8 bits								1 byte = 8 bits							
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
O:1.0	**Reserved Read-Only**															
O:1.1	Receive (Rx) Acknowledge: bits 8~15 Inst1=bit8, Inst2=bit9, .., Inst8=bit15								Transmit (Tx) Toggle: bits 8~15 Inst1=bit0, Inst2=bit1, .., Inst8=bit7							
MO:0.0	Instance 1: Transmit ASCII Character 1								Instance 1: Transmit Data Size (length)							
MO:0.1	Instance 1: Transmit ASCII Character 2								Instance 1: Transmit ASCII Character 3							
MO:0.2	Instance 2: Transmit ASCII Character 1								Instance 2: Transmit Data Size (length)							
MO:0.3	Instance 2: Transmit ASCII Character 2								Instance 2: Transmit ASCII Character 3							
: :	:								:							
MO:0.149	:								:							

Mapping the Poll I/O Connection to AB-1747-SDN:

Before using the RSNetWorx to map the poll I/O connection to 1747-SDN DeviceNet master scanner, the total number of bytes of the *Poll Produce Size* & *Poll Consume Size* must be determined. The format of the poll response and poll command are listed below:

Poll Response: [TxAck bits1~8][RxToggle bits1~8][Rx Data Inst.1] …[Rx Data Inst.8]
Poll Command: [TxToggle bits1~8][RxAck bits1~8][Tx Data Inst.1] …[Tx Data Inst.8]

The poll produce size is the size (bytes) of the poll response and the poll consume size is based upon the size (bytes) of the poll command. The data DeviceNet packets for each can have as many as eight data instances. The poll produce size and the poll consume size are each based on the number of instances and data size used in each Rx/Tx packet. The data size for *Short String* data type for each serial receive/transmit is:

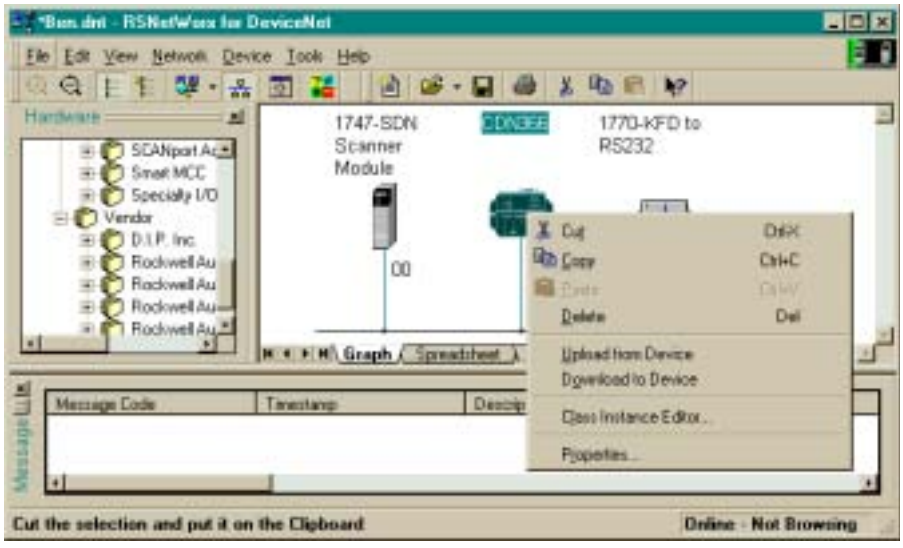
Data Size (bytes) = 1 + number of ASCII character to receive.

The constant "1" is one byte reserve for the short string data size length. So if 3 bytes of short-string data are used, the data size should be set to 4 bytes to include the length byte.

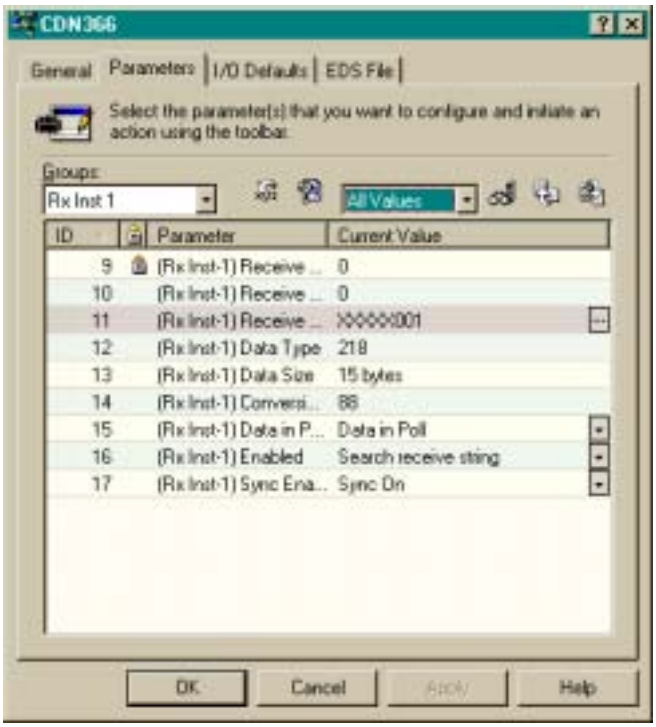
Example: Using RSNetWorx for DeviceNet to map CDN366 for receiving 14 bytes of barcode data and transmitting 1 byte for data confirmation. Typical in many applications, CDN366 is setup to use only one instance.
Rx Instance 1 data size = 1 + 14 = 15 bytes
Tx Instance 1 data size = 1 + 1 = 2 bytes

For short string (poll response and poll command):
Consume size = 2 (handshaking) + 1 (length) + number of data byte (exclude delimiter)

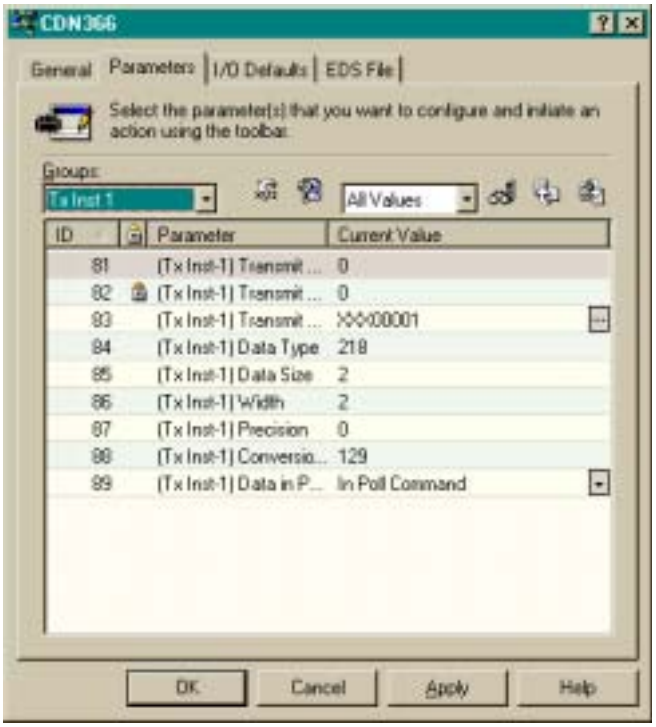
For numeric (Real, usint, etc.):
Consume size = 2 (handshaking) + number of data byte (exclude delimiter)



1) In RSNetWorx, right click on the CDN366 icon.
2) Double click on "**Properties**"
3) The menu "**CDN366**" should pop up.
4) Click on "**Parameters**"
5) If the "**EDS Editor**" prompts, click on "**Upload**"

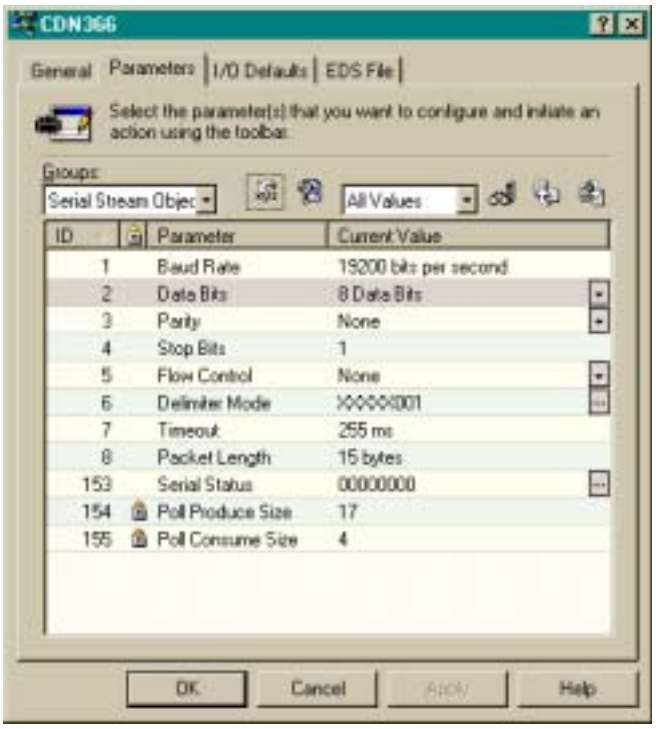


6) If the "**EDS Editor**" menu is not prompted then click on the "**Upload**" icon to upload the latest parameters to the CDN366.
7) Click on "**All Parameters**" and select "**Rx Inst 1**".
8) Click on "**(Rx Inst-1) Data Size**" and enter 15.
9) Since the example is short-string data type. Click on "**(Rx Inst-1) Data Type**" and enter 218.
10) Click on "**(Rx Inst-1) Data in Poll Command**" and set "**Data in Poll**".
11) Disable "**Rx Inst-2 to Rx Inst-8**" serial receive by setting "**Data not in Poll**".

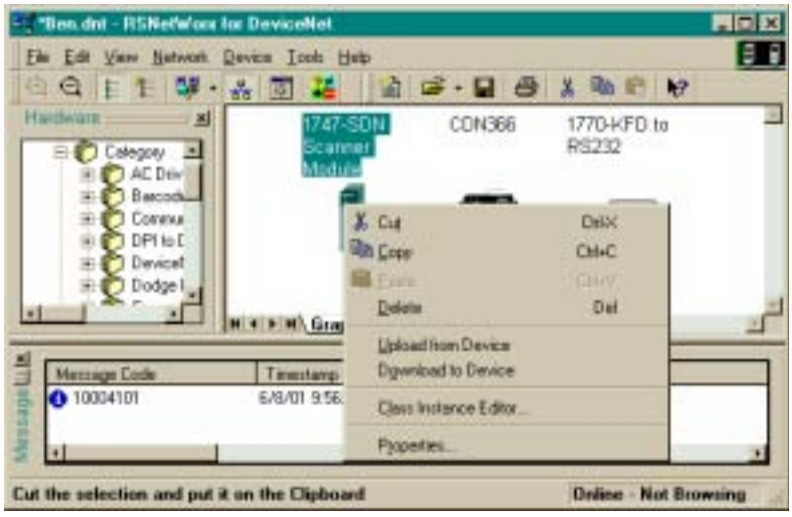


12) Click on "**Rx Inst 1**" in **Groups:** and select "**Tx Inst 1**".
13) Click on "**(Tx Inst-1) Data Size**" and enter 2.
14) Since this example uses the short-string data type. Click on "**(Tx Inst-1) Data Type**" and enter 218.
15) Click on "**(Tx Inst-1) Data in Poll Command**" and set "**In Poll Command**".
16) Disable "**Tx Inst-2 to Tx Inst-8**" serial transmit by setting "**Data not in Poll Command**". Click"**OK**".
17) The "**EDS Editor**" menu is prompted, click on "**Yes**" to download new parameter settings to CDN366.

Verify the new parameters are correct. If a parameter is incorrect then make the necessary changes.

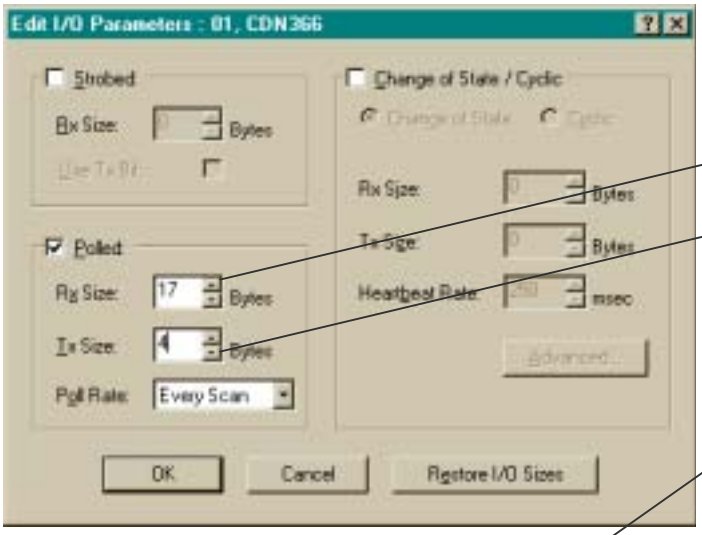


18) In "**Groups:**" select "**Serial Stream Object**"
19) The "**Poll Produce Size**" and "**Poll Consume Size**" are automatically adjusted based on the new configuration. The 17 and 4 bytes are needed to map to 1747-SDN module.

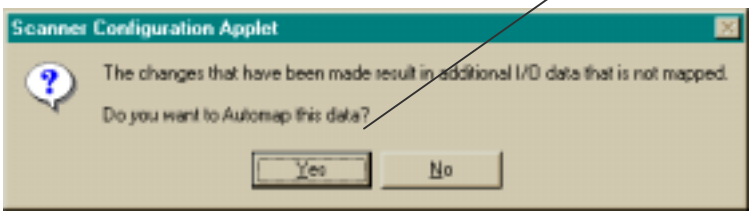


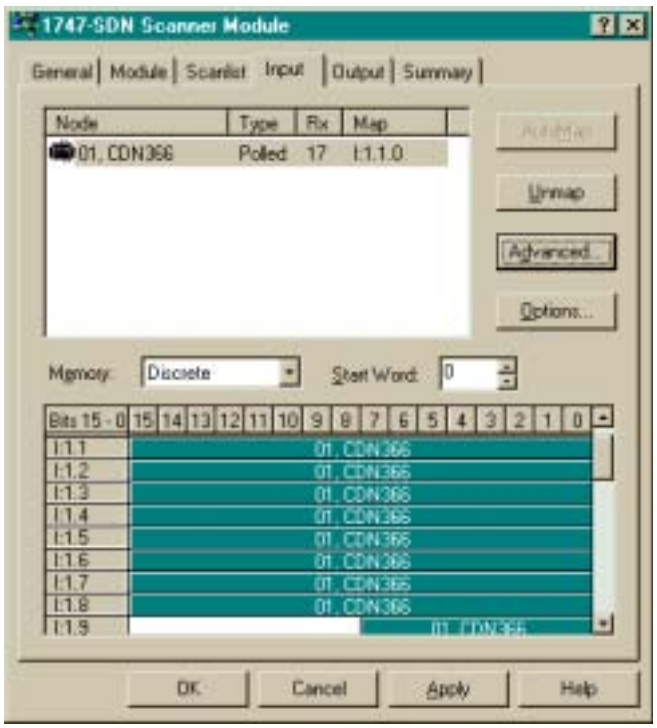
20) In RSNetWorx, right click on the CDN366 icon.
21) Double click on "**Properties**"
22) The "**1747-SDN Scanner Module**" menu is prompted.
23) Click on "**Scanlist**" and "**Scanner Config. Applet**". A menu is prompted.
24) Click on "**Upload**" to upload parameters from scanner module.

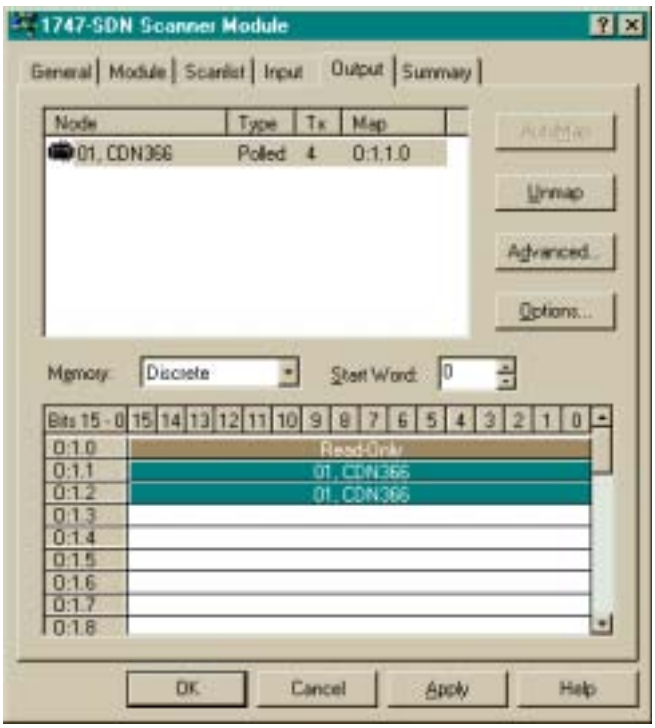
25) Move the CDN366 from the box "**Available Devices**" to the box "**Scanlist**".
26) Click on "**Edit I/O Parameters**"



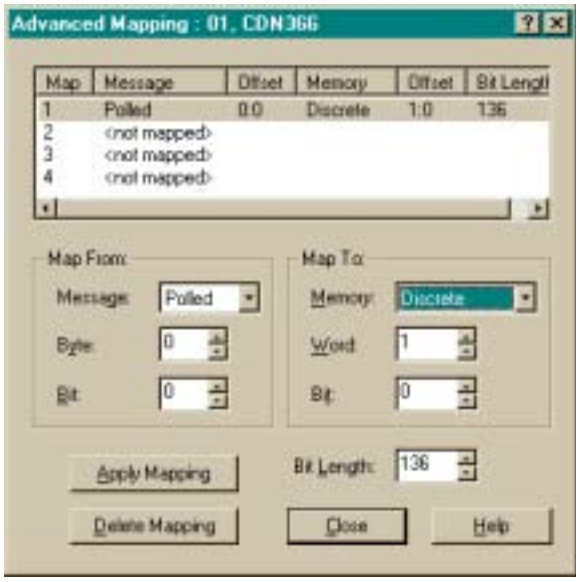
27) The byte values from "**Poll Produce Size**" and "**Poll Consume Size**" are 17 and 4.
28) Enter 17 on box Rx Size (bytes).
29) Enter 4 on box Tx Size (bytes).
30) Click on "**OK**".
31) User preference, "Do You want to Automap this data?" In this particular example, click on "**Yes**". If "**No**", user must select to manually map I/O in the memory tables.


Scanner Configuration Applet
The changes that have been made result in additional I/O data that is not mapped.
Do you want to Automap this data?
Yes
No





32) After selecting Automap, the discrete Input/Output tables should look the same as above.



33) The Advance I/O Mapping shows current mapping configurations. The memory *Map To* is *Discrete* (not M-file, based on user preference/applications). The data map starts in the memory register of Word 1, Bit 0. The Output Bit Length is 32 (equivalent to 4 bytes), and the Input Bit Length is 136 (equivalent 17 bytes). Click on "**Close**" to exit. Click on "**Apply**". Click "Yes" to download these changes to 1747-SDN memory.

Basic Troubleshooting

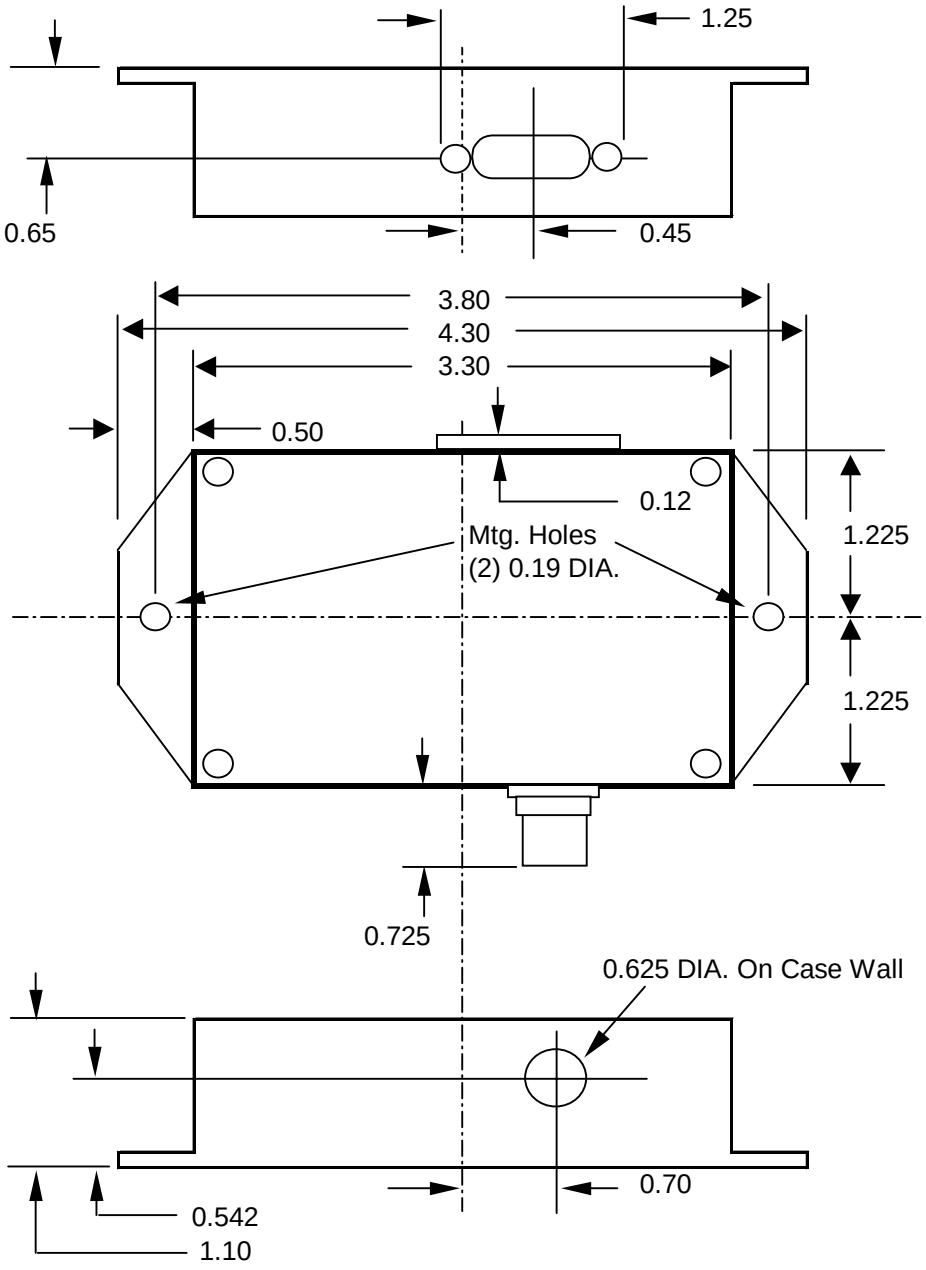
Problem	***Could be caused by***
1) DeviceNet master scanner did not recognize the device.	1) EDS file is not registered.
2) DeviceNet master scanner did not recognize the device after loading the EDS file.	2) Device minor and major revisions do not match EDS file. Verify EDS file minor & major revisions.
3) Device did not appear on the DeviceNet network.	3) Verify wiring connection & correct voltage. Verify node address is not occupied by anther device. Verify baud rate switch matches the network baud rate.
4) After configuring the node address, the DeviceNet master scanner did not recognize the device.	4) Disconnect the device before changing the node address.Verify node address is not occuppied by another device. Verify node address is setup by software or hardware. Verify DeviceNet network baud rate.
5) Net LED indicator light is flashing red.	5) Device is removed from the Scanlist or network. Recycle the device power to reset the NET LED.
6) Net LED indicator light is solid red.	6) Verify node address is not occuppied by other device. DeviceNet network failure.
7) Net LED indicator light is off.	7) Verify DeviceNet network baud rate. Verify DeviceNet network wiring and connection.
8) MOD LED indicator light is flashing/solid red.	8) Device has failed. If necessary, replace the device.
9) RX LED indicator light does not flash green when data is sent to the device.	9) If Sync is enabled, verify receive toggle & receive acknowledge bits are toggled. If the receive acknowledge bit is not toggled, the device is not receiving data. Verify data is received in Receive Data attribute in class=65, instance=1, attribute=3. If Sync is disabled, verify data is received in Receive Data attribute in class=65, instance=1, attribute=3. Verify data was sent from source (barcode reader, etc..)
10) RX LED indicator light is solid red after the device received data.	10) Device memory buffer is overflow or parity error. Check the Serial Status byte (class=64, inst.=1, attribute=15). Make sure parity setting match the serial connection.
11) TX LED indicator light is solid red after receiving data from the DeviceNet.	11) Device memory buffer is overflow or parity error. Check the Serial Status byte (class=64, inst.=1, attribute=15). Make sure parity setting match the serial connection.
12) TX LED indicator light is not flashing green when data is transmitted from the device.	12) Verify transmit toggle bit is toggled. If the transmit toggle bit is not toggled, the device will not transmit data.Verify data is transmitted in Transmit Data attribute in class=66, instance=1, attribute=3.
13) 1747-SDN master scanner displays error code 77.	13) Poll produce size and/or poll consume size (bytes) is mis-matched with poll Rx/Tx sizes setting in 1747-SDN.

ASCII Table

Non-Printing Characters					Printing Characters								
Name	**Ctrl char**	**Dec**	**Hex**	**Char**	**Dec**	**Hex**	**Char**	**Dec**	**Hex**	**Char**	**Dec**	**Hex**	**Char**
null	ctrl-@	0	00	NUL	32	20	Space	64	40	@	96	60	`
start of heading	ctrl-A	1	01	SOH	33	21	!	65	41	A	97	61	a
start of text	ctrl-B	2	02	STX	34	22	"	66	42	B	98	62	b
end of text	ctrl-C	3	03	ETX	35	23	#	67	43	C	99	63	c
end of xmit	ctrl-D	4	04	EOT	36	24	$	68	44	D	100	64	d
enquiry	ctrl-E	5	05	ENQ	37	25	%	69	45	E	101	65	e
acknowledge	ctrl-F	6	06	ACK	38	26	&	70	46	F	102	66	f
bell	ctrl-G	7	07	BEL	39	27	'	71	47	G	103	67	g
backspace	ctrl-H	8	08	BS	40	28	(	72	48	H	104	68	h
horizontal tab	ctrl-I	9	09	HT	41	29	)	73	49	I	105	69	i
line feed	ctrl-J	10	0A	LF	42	2A	*	74	4A	J	106	6A	j
vertical tab	ctrl-K	11	0B	VT	43	2B	+	75	4B	K	107	6B	k
form feed	ctrl-L	12	0C	FF	44	2C	,	76	4C	L	108	6C	l
carriage feed	ctrl-M	13	0D	CR	45	2D	-	77	4D	M	109	6D	m
shift out	ctrl-N	14	0E	SO	46	2E	.	78	4E	N	110	6E	n
shift in	ctrl-O	15	0F	SI	47	2F	/	79	4F	O	111	6F	o
data line escape	ctrl-P	16	10	DLE	48	30	0	80	50	P	112	70	p
device control 1	ctrl-Q	17	11	DC1	49	31	1	81	51	Q	113	71	q
device control 2	ctrl-R	18	12	DC2	50	32	2	82	52	R	114	72	r
device control 3	ctrl-S	19	13	DC3	51	33	3	83	53	S	115	73	s
device control 4	ctrl-T	20	14	DC4	52	34	4	84	54	T	116	74	t
neg acknowledge	ctrl-U	21	15	NAK	53	35	5	85	55	U	117	75	u
synchronous idel	ctrl-V	22	16	SYN	54	36	6	86	56	V	118	76	v
end of xmit block	ctrl-W	23	17	ETB	55	37	7	87	57	W	119	77	w
cancel	ctrl-X	24	18	CAN	56	38	8	88	58	X	120	78	x

end of medium	ctrl-Y	25	19	EM	57	39	9	89	59	Y	121	79	y
substitute	ctrl-Z	26	1A	SUB	58	3A	:	90	5A	Z	122	7A	z
escape	ctrl-[	27	1B	ESC	59	3B	;	91	5B	[	123	7B	{
file separator	ctrl-\	28	1C	FS	60	3C	<	92	5C	\	124	7C	|
group separator	ctrl-]	29	1D	GS	61	3D	=	93	5D	]	125	7D	}
record separator	ctrl-^	30	1E	RS	62	3E	>	94	5E	^	126	7E	~
unit separator	ctrl-_	31	1F	US	63	3F	?	95	5F	_	127	7F	DEL

CDN366 Enclosure Dimensions



CDN366 Template

Class	*Instance*	*Attribute*	*Default*	*Setting*	*Unit*	*Comments*

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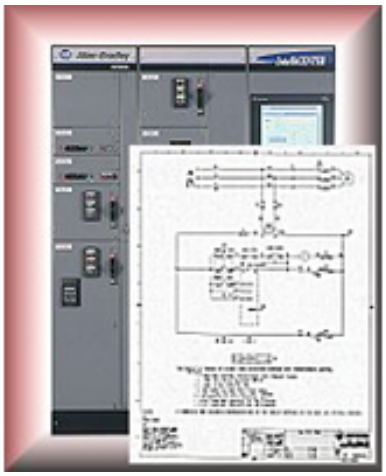

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1746/1747 I/O Modules

I/O Adapter Modules | Analog I/O Modules | Chassis, Power Supplies, RTBs | Digital I/O Modules
Communication Modules | Positioning I/O Modules | Process Control I/O Modules | Programming Device

I/O Adapter Modules

Product/Title	Catalog Number	Publication Type	Date	Publication Number
ControlNet Adapter Module	1747-ACN15, -ACNR15	Installation Instructions	May 2001	1747-IN017C-EN-P
		Product Profile	Nov 2000	1747-PP008A-EN-P
		Firmware Release Note	May 2001	1747-RN653A-EN-P
RSNetWorx for ControlNet Compatibility with the SLC ControlNet Scanner/Adapter	1747-ACN15, -ACNR15, -SCNR	Release Note	May 2000	CNET-RN001A-EN-P
SLC 500 Remote I/O Adapter Module	1747-ASB	Product Data	Apr 1996	1747-2.38
		Installation Instructions	May 2001	1747-IN014B-EN-P
		User Manual	Dec 1996	1747-6.13

Analog I/O Modules

Product	Catalog Number	Publication Type	Date	Publication Number
1746 Eight Channel Analog Input Module for Demanding Process Control	1746	Product Profile	Apr 1997	1746-1.11
Analog I/O Modules for SLC based Processors	1746-FIO4I and -FIO4V	User Manual	May 1995	1746-6.9
		Document Update	Jan 1996	1746-6.9-DU1
Analog I/O Modules for SLC 500™ Programmable Controllers	1746-FIO4I, -FIO4V, -NI4, -NI8, -NIO4I, -NIO4V, -NO4I, -NO4V, -NI8, -NI16I, -NO4I, AND -NO4V	Technical Data	May 2000	1746-TD001A-EN-P
SLC500 32-Point Discrete I/O Module	1746-IB32, -IV32, -OB32, -OB32E, -OV32	Installation Instructions	Aug 2001	1746-IN023A-EN-P
SLC500 Analog I/O Modules	1746-NI4, -NIO4I, -NIO4V, -NO4I, -NO4V, -FIO4I, and FIO4V	Installation Instruction	Mar 2000	1746-IN008A-US-P
SLC 500 Analog I/OModule	1746-NI4, -NIO4I, -NIO4V, -NO4I, -NO4V	User Manual	Jan 1996	1746-6.4
SLC Analog Input Module	1746-NI8	Installation Instructions	Feb 2000	1746-IN006A-US-P
		User Manual	Apr 1997	1746.6.8

High Density Analog Input Modules for Demanding Process Control Applications	1746-NI8, -NI16I, -NI16V	Product Profile	Nov 1999	1746-PP001A-US-P
SLC 500 Analog Input Modules	1746-NI16I, 1746-NI16V	User Manual	Dec 1999	1746-UM001A-US-P
		Installation Instructions	Dec 1999	1746-IN001B-US-P
SLC 500 RTD/Resistance Input Module	1746-NR4 and 1746-NR8	Technical Data	Aug 2000	1746-TD007B-EN-P
		Installation Instructions	May 2001	1746-IN012B-EN-P
		User Manual	Jun 1998	1746-6.7
1746-NR8 Eight Channel RTD/Resistance Input Module	1746-NR8	Product Profile	Dec 1999	1746-PP003A-US-P
SLC500 RTD/Resistance Input Module		Installation Instructions	May 2000	1746-IN007B-EN-P
		User Manual	June 2000	1746-UM003A-EN-P
SLC 500 Thermocouple/mV Input Module	1746-NT4, Series B	Installation Instructions	Jun 2001	1746-IN010B-EN-P
		User Manual	Jan 1996	1746-6.6.1
SLC 500 Thermocouple/mV Input Module	1746-NT4, -NT8, -INT4	Technical Data	Apr 2000	1746-TD002A-EN-P
1746-NT8 for the SLC 500 Platform	1746-NT8	Product Profile	Nov 1999	1746-PP002A-US-P
SLC500 Thermocouple/mV Analog Input Module		Installation Instructions	Mar 2001	1746-IN015B-EN-P
		User Manual	Jul 1999	1746-6.22
SLC500 Thermocouple/mV Input Module Terminal Block	1746-RT34	Installation Instructions	Mar 2001	1746-IN018B-EN-P
SLC500 RTD/Resistance Input Module Terminal Block	1746-RT35	Installation Instructions	Mar 2001	1746-IN019B-EN-P
SLC500 Input Simulator	1746-SIM	Installation Instructions	Oct 2001	1746-IN024A-EN-P
Program Storage Device Installation Instructions	1747-PSD	Installation Instructions	Nov 2001	1747-IN001B-EN-P

Chassis, Power Supplies, RTBs

Product/Title	Catalog Number	Publication Type	Date	Publication Number
SLC Expansion Chassis -- Inaccurate I/O Configuration Report for SLC 500 with RSLogix 500 Programming Software	1746-A2	Application Note	Feb 2000	1746-AP001A-US-P
SLC Modular Chassis	1746-A4, -A7, -A10, and -A13 Series B	Installation Instructions	Sep 2000	1746-IN016A-MU-P
SLC 500 Modular Chassis and Power Supplies	1746-A4, -A7, -A10, and -A13; Power Supply Cat. Nos. 1746-P1, -P2, -P3, -P4, -P5, -P6 and -P7	Technical Data	Apr 2000	1746-TD003A-EN-P
SLC 500 Power Supplies	1746-P1, 1746-P2, 1746-P3, 1746-P4, 1746-P5, 1746-P6, 1746-P7)	Installation Instructions	Oct 2001	1746-IN004B-MU-P
12/24V dc Power Supply Expands SLC 500 Control Capabilities	1746-P7	Product Profiles	Mar 1999	1746-1.21
Removable Terminal Blocks	1746-RT25B, -RT25C, -RT25G, -RT25R, and -RT32	Installation Instructions	Jun 1999	1746-5.9

Digital I/O Modules

Product/Title	Catalog Number	Publication Type	Date	Publication Number
Discrete I/O Modules	1746 Series	Installation Instructions	Jan 2000	1746-IN005A-US-P
Discrete Input and Output Modules	1746-IA4, -IA8, -IA16, -IB8, -IB16, -IB32, -IC16, -IG16, -IH16, -IM4, -IM8, -IM16, -IN16, -ITB16, -ITV16, -IV8, -IV16, -IV32, -OA8, -OA16, -OAP12, -OB8, -OBP8, -OB16, -OBP16, -OB32, -OG16, -OV8, -OV16, -OVP16, -OV32, -OW4, -OW8, -OW16, -OX8, -IO4, -IO8, -IO12, -I012DC	Technical Data	Jul 1999	1746-2.35

SLC500 32-Point I/O Modules	1746-IB32, -IV32, -OB32, and -OV32	Installation Instructions	Dec 1998	1746-5.19

Communication Modules

Product/Title	Catalog Number	Publication Type	Date	Publication Number
1746-BAS Module Floating Point Conversion	1746-BAS	Release Notes	Sep 1999	1746-DU001A-US-P
SLC500 BASIC and BASIC-T Modules	1746-BAS and 1746-BAS-T	Installation Instructions	Mar 2000	1746-IN009A-US-P
		User Manual	Apr 2000	1746-UM004A-US-P
BASIC Language		Reference Manual	Apr 2000	1746-RM001A-US-P
SLC500 BASIC Module and BASIC Development Software	1746-BAS and 1747-PBASE	Technical Data	Aug 2000	1746-TD005B-EN-P
1746-BAS-T High Performance Basic Module	1746-BAS-T	Product Profile	Dec 1999	1746-PP004A-US-P
SLC500 BASIC and Basic-T Modules		User Manual	Apr 2000	1746-US004A-US-P
BASIC Development Software	1746-PBASE	Programming Manual	May 2000	1746-PM001A-US-P
ASCII Data Transfer to the SLC 500 BASIC Module (Series B)		Application Note	Sep 1996	1746-2.41
Back Up Your SLC 500 Control System with the 1747-BSN	1747-BSN	Product Profile	Nov 1999	1747-PP001A-US-P
		Technical Data	Feb 2000	1747-TD002A-US-P
Backup Scanner Module		Installation Instructions	Sep 1999	1747-5.38
		User Manual	Oct 1999	1747-6.22
Direct Communication Module	1747-DCM	Product Data	Jan 1997	1747-2.33
		Installation Instructions	Feb 2000	1747-IN005A-US-P
		User Manual	Jun 1996	1747-6.8
Distributed I/O Scanner	1747-DSN	Product Data	May 1998	1747-2.35
DH-485/RS-232C Interface Module	1747-KE	Installation Instructions	Feb 2000	1747-IN006A-US-P
DH-485/RS-232C Interface Module Firmware Upgrade	1747-KEU	Installation Instructions	March 1994	1747-5.4
ControlNet Messaging Module	1747-KFC15	Product Profile	Dec 1999	1747-PP004A-US-P
API Software for 1746 I/O PCI Interface and 17147-OC Open Controller	1747-OCF, -PCIS	User Manual	Jun 2000	1747-UM002A-US-P
Chassis Interface Module for 1746 Local I/O	1747-PCIL	Installation Instructions	Apr 1998	1747-5.32
		Release Notes	Jul 1998	1747-5.32-RN1
PCI Bus Card for 1746 Local I/O	1747-PCIS/CIS2/PCIS2	Installation Instructions	Apr 1998	1747-5.31
ControlNet Scanner Module	1747-SCNR	Product Profile	Mar 2001	1747-PP005A-US-P
		Reference Manual	Feb 2001	1747-RM623B-EN-P
1747-SDN DeviceNet Scanner Module	1747-SDN/B	Installation Instructions	Aug 2001	1747-IN058B-EN-P
		Release Note	Jul 2001	1747-RN007B-EN-P
1747-SDN and Explicity Messaging	1747-SDN	Release Note	Jun 1999	1747-6.5.2-RN2
Remote I/O Scanner	1747-SN	Product Data	Mar 1996	1747-2.34
		User Manual	Jul 1996	1747-6.6
		Installation Instructions	Jun 01	1747-IN060B-EN-P

Positioning I/O Modules

Product/Title	Catalog Number	Publication Type	Date	Publication Number

1746 Multi-Channel High-Speed Counter Module for Demanding Positioning, Packaging and Material Handling Applications	1746	Product Profiles	Aug 1999	1746-1.20
Blow Molding Module	1746-BLM	Product Profile	Feb 2001	1746-PP019B-EN-P
		Installation Instructions	Jan 2001	1746-IN014B-EN-P
High-Speed Counter Module	1746-HSCE	Product Data	Jan 1997	1746-2.32
		Installation Instructions	Apr 2001	1746-IN011B-EN-P
		User Manual	Apr 1996	1746-6.5
Multi-Channel High-Speed Counter Module	1746-HSCE2	User Manual	Apr 2000	1746-UM002A-US-P
		Product Data	Jul 1999	1746-2.44
		Installation Instructions	Feb 2000	1746-IN002A-US-P
Stepper Controller Module	1746-HSTP1	User Manual	Dec 1999	1746-999-121
Mold Pressure Module	1746-MPM	Installation Instructions	Jul 1998	1746-5.13

Process Control I/O Modules

Product/Title	Catalog Number	Publication Type	Date	Publication Number
Barrel Temperature Control Module	1746-BTM	User Manual	Apr 2001	1746-UM010B-EN-P
Open-Loop Velocity Control Module Addresses Common Hydraulic Problems	1746-QV	Product Profile	Feb 1997	1746-1.10

Programming Device

Product/Title	Catalog Number	Publication Type	Date	Publication Number
SLC-500 and MicroLogix Program Storage Device for Easy Backup, Storage and Transfer of PLC Programs	1747	Product Profile	May 1993	1747-1.22
Data Table Access Module (Engineer's Reference)	1747-DTAM	Pocket Quick Reference	May 1993	1747-902
Data Table Access Module (Operator's Reference)			May 1993	1747-903
Program Storage Device	1747-PSD	Document Update	Sep 2001	1747-DU003B-EN-P
		Installation Instructions	Nov 2001	1747-IN001B-EN-P

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Important Notices

Installation Instructions

DeviceNet RS-232 Interface Module

(Catalog Number 1770-KFD and 1770-KFDG)

To the Installer

The 1770-KFD module is a portable RS-232 communication interface that provides a host computer access to a DeviceNet™ network.

This document contains this information:

topic	page
purpose and audience	2
precautionary statements	2
handling the module	4
terminology	4
related publications	4
contents of your order	5
introduction to the RS-232 module	8
communicating on DeviceNet	9
mounting the module	10
supplying power	12
connecting cables via RS-232 to a computer	14
connecting cables via RS-232 to a modem	16
connecting cables via DeviceNet	17
installing the 1770-KFD driver	22
interpreting status indicators	23
specifications	25
support services	26

New or modified information is highlighted by a revision bar.

Publication 1770-5.6 – June 1996

Purpose

Use this document to learn how to install and use the DeviceNet RS-232 interface module.

Audience

Read this manual before you install or use the DeviceNet RS-232 interface module. You should be familiar with DeviceNet technology.

Precautionary Statements

Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Allen-Bradley does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Allen-Bradley publication SGI-1.1, *Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control* (available from your local Allen-Bradley office), describes some important differences between solid-state equipment and electromechanical devices that should be taken into consideration when applying products such as those described in this publication.

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Throughout this document we use notes to make you aware of safety considerations:

ATTENTION: This notation identifies information about practices or circumstances that can lead to personal injury or death, property damage or economic loss.

Attention statements help you to:

- identify a hazard
- avoid the hazard
- recognize the consequences

Important: This notation identifies information that is critical for successful application and understanding of the product.

European Union Directive Compliance

This product has the CE mark and is approved for installation within the European Union and EEA regions. It has been designed and tested to meet the following directives.

EMC Directive: This apparatus is tested to meet Council Directive 89/336/EEC Electromagnetic Compatibility (EMC) using a technical construction file and the following standards, in whole or in part:

- EN 50081-2 EMC – Generic Emission Standard, Part 2 – Industrial Environment
- EN 50082-2 EMC – Generic Immunity Standard, Part 2 – Industrial Environment

The product described in this manual is intended for use in an industrial environment.

Low Voltage Directive: This apparatus is also designed to meet Council Directive 73/23/EEC Low Voltage, by applying the safety requirements of EN 61131-2 Programmable Controllers, Part 2 – Equipment Requirements and Tests.

For specific information that the above norm requires, see the appropriate sections in this manual, as well as the following Allen-Bradley publications:

- Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1
- Guidelines for Handling Lithium Batteries, publication AG-5.4
- Automation Systems Catalog, publication B111

Handling the Module

ATTENTION: This RS-232 module uses CMOS technology, which is highly sensitive to electrostatic discharge (ESD). ESD may be present whenever you are handling the module.

Take these precautions to guard against electrostatic damage:

- Avoid touching the interface connector pins on the RS-232 module.
- If the module is not in use, store it in the anti-static bag in which it was shipped.

It is not necessary to wear an ESD wrist strap while handling the 1770-KFD module.

Terminology

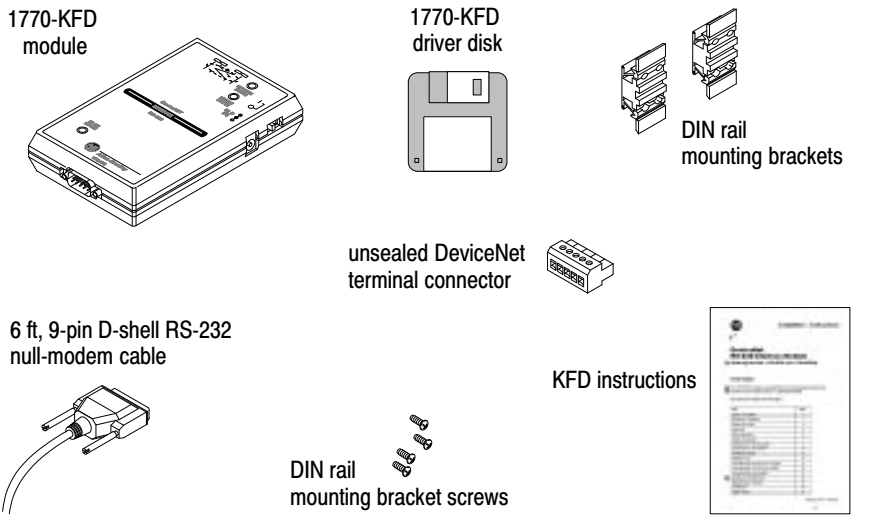
this term	means
DeviceNet	an open communication network designed to connect control systems to plant floor devices, e.g., sensors, push buttons, motor starters, and drives DeviceNet is based on commercially available technology and can be used by any company to develop interoperable products.
node configuration	to configure the node address and data rate before a device is connected to a DeviceNet network
parameter configuration	to configure the operational parameters of a DeviceNet device
point-to-point configuration	a two-node DeviceNet network consisting of a 1770-KFD interface module and a device

Related Publications

title	publication number
DeviceNet Manager Software User Manual	1787-6.5.3
DeviceNet Cable System Planning & Installation Manual	DN-6.7.1
DeviceNet RS-232 Interface Module Communication Protocol Reference Manual	1770-6.5.22

Contents of Your 1770-KFD Order

With this package you should receive:



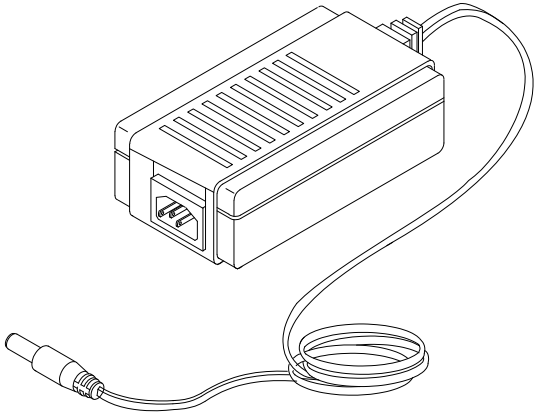
- one DeviceNet RS-232 interface module, catalog no. 1770-KFD
- one 1770-KFD driver diskette
- two DIN rail mounting brackets
- four DIN rail mounting bracket screws
- one 6 ft, 9-pin D-shell RS-232 null-modem cable
- one unsealed DeviceNet terminal connector
- one copy of publication 1770-5.6, DeviceNet RS-232 Interface Module Installation Instructions

If you ordered catalog no. 1770-KFDG, your order also includes a global 9V ac power supply adapter (90 – 260V ac).

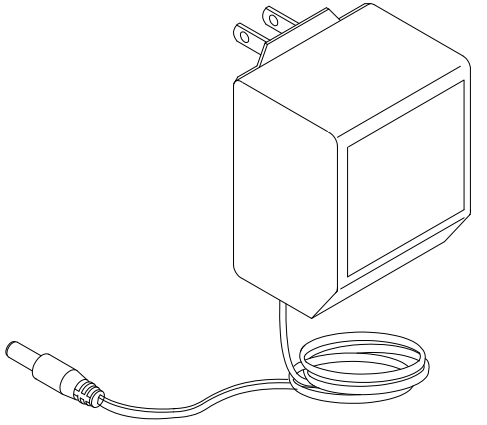
If you are missing any of these pieces, contact your Allen-Bradley sales representative.

Available options:

- global 9V ac power supply adapter (90 – 260V ac), *which comes with catalog no. 1770KFDG/A*

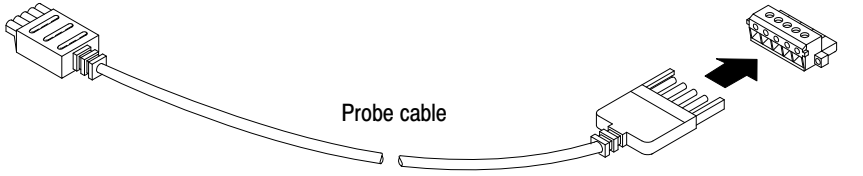


- domestic 9V ac power supply adapter (120V ac), *which you can order separately as catalog no. 1787USADPTR/A*

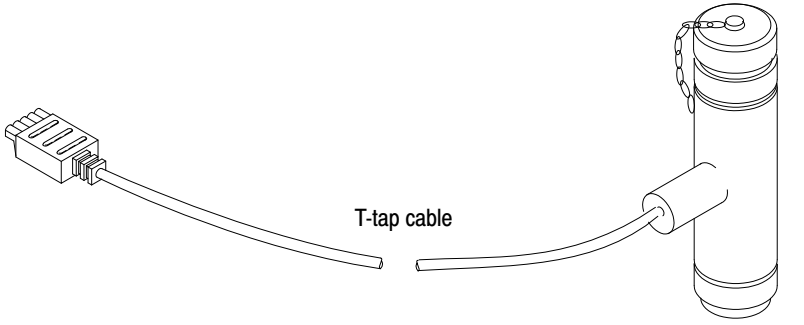


Each adapter connects to the power supply connector on the 1770-KFD module. See page 12 for additional information.

- an 8 ft, 5-pin DeviceNet unsealed probe cable (catalog no. 1787-PCABL), *which you can order separately*

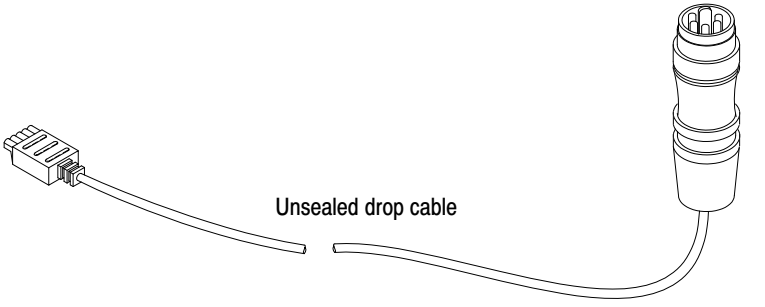


- a 6 ft, sealed T-tap DeviceNet connector cable (catalog no. 1787-TCABL), *which you can order separately*



This cable connection lets the 1770-KFD module and a device connected to the module in a point-to-point configuration draw power from the network.

- a 6 ft, unsealed-to-sealed DeviceNet drop cable (catalog no. 1787-MCABL), *which you can order separately*



Each cable connects to the 5-pin unsealed receptacle on the 1770-KFD module. See cable connection information beginning on page 17.

Introducing the 1770-KFD Interface Module

The 1770-KFD module, described in Figure 1, is a portable RS-232 communication interface that provides a host computer access to a DeviceNet network.

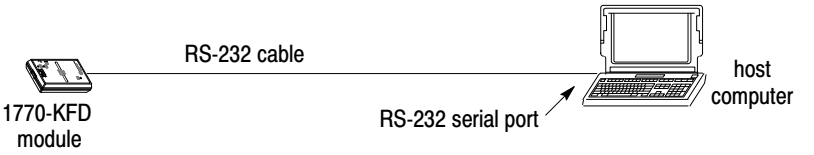
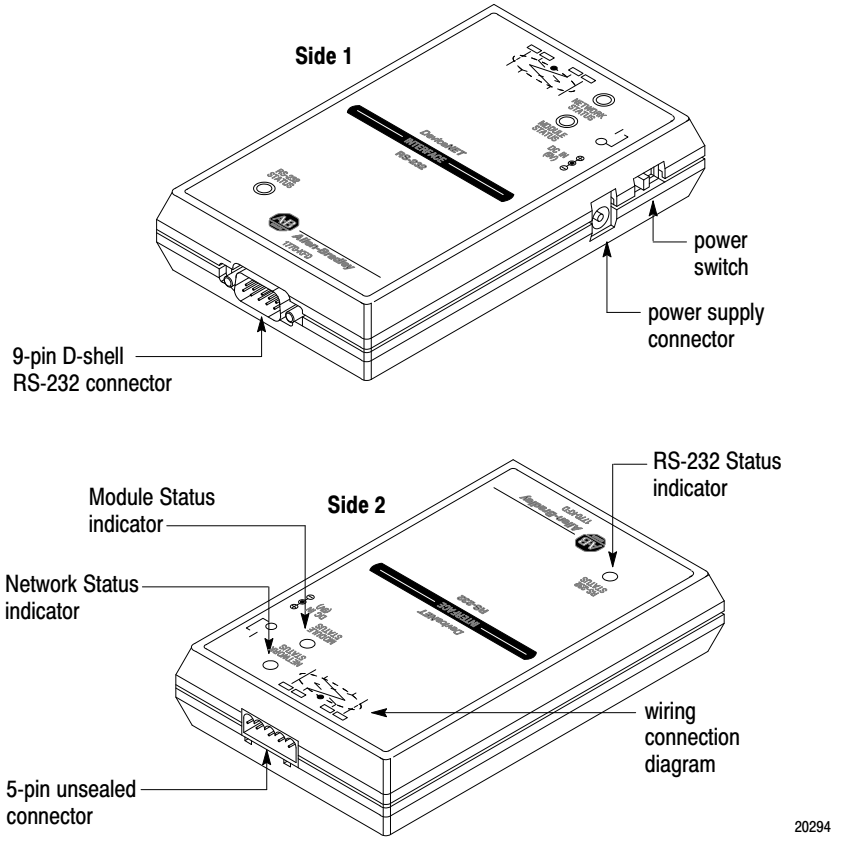


Figure 1
1770-KFD module

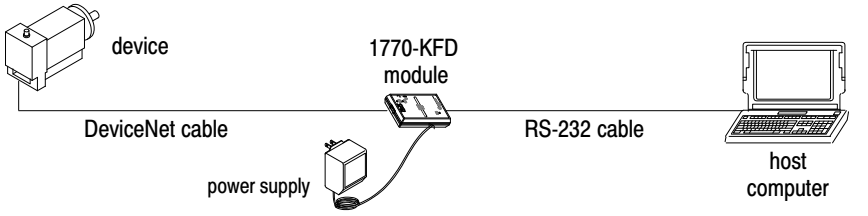


Communicating on DeviceNet

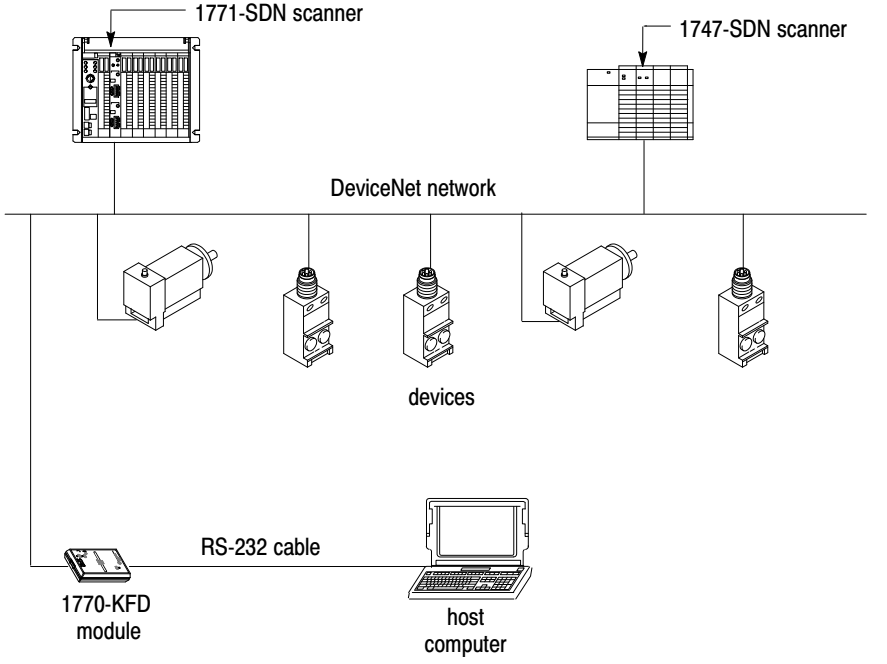
The 1770-KFD module lets you communicate:

- point-to-point (host computer directly to device via the 1770-KFD module)

  The host computer uses a point-to-point connection for node and/or parameter configuration.



- via a DeviceNet network connection



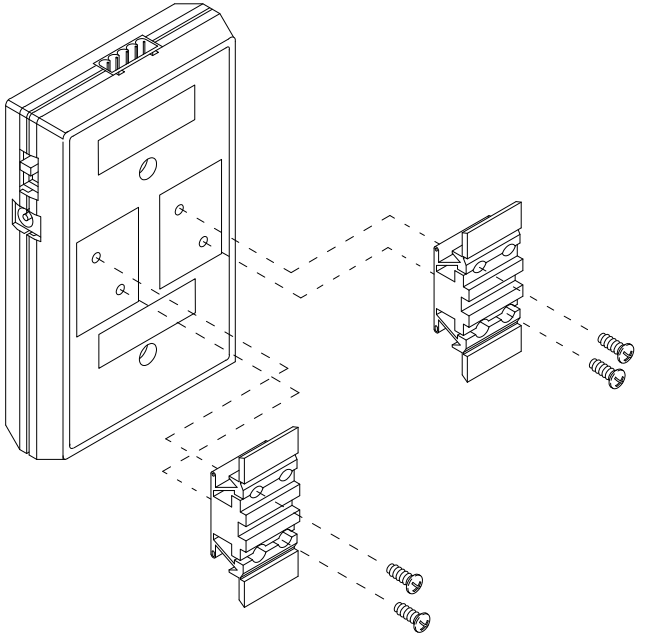
The 1770-KFD module performs data transmission, management, and local network diagnostics.

Allen-Bradley DeviceNet Manager software, 1787-MGR, manages data transmission and reception through the 1770-KFD interface module from a personal computer (Windows™ operating system).

Mounting the 1770-KFD Module

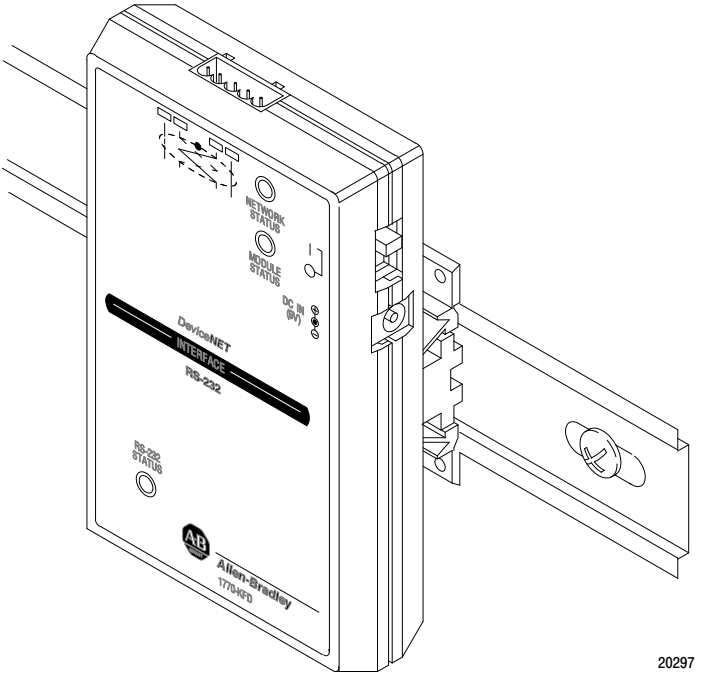
You can mount the module on a DIN rail.

1. Use the four screws to attach the two mounting brackets to the back of the module.



20296

2. Snap the mounting brackets onto the DIN rail.



Supplying Power to the 1770-KFD Module

The 1770-KFD module can be powered from either an external power supply or from a DeviceNet network.

Supplying Power via AC Wall Adapter

Figure 2 shows the power supply, catalog no. 1787-USADPTR, that takes 120V ac and outputs 9V dc at 1 amp.

Figure 2
Domestic 9V ac wall adapter

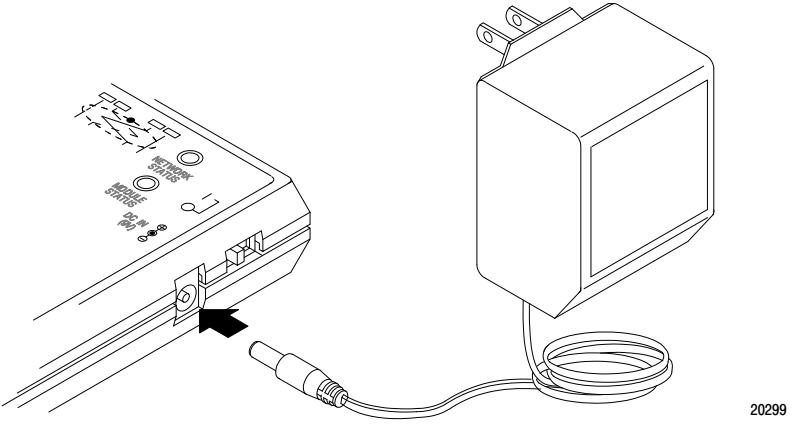
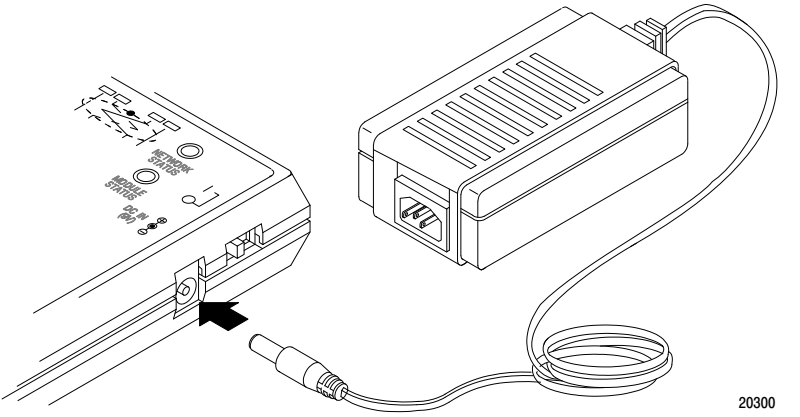


Figure 3 shows the global power supply, which takes 90 – 260V ac, 47 – 63 Hz, and outputs 9V dc. This power supply is available only with the 1770-KFD module as catalog no. 1770-KFDG.

Figure 3
Global 9V ac wall adapter



Important: You **must** supply the cable between the adapter and the outlet.

Supplying Power via Network

The DeviceNet network can power the 1770-KFD module.

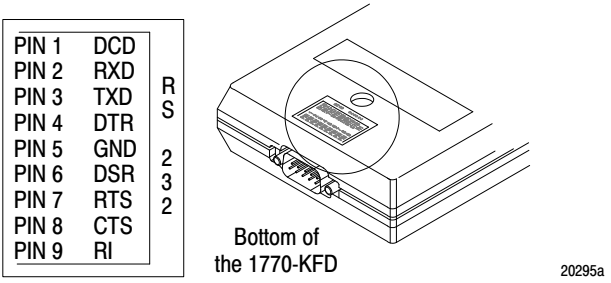
Important: When the module is connected to a powered DeviceNet network, the network connection *overrides* the external power supply.

Supplying Power to a Device

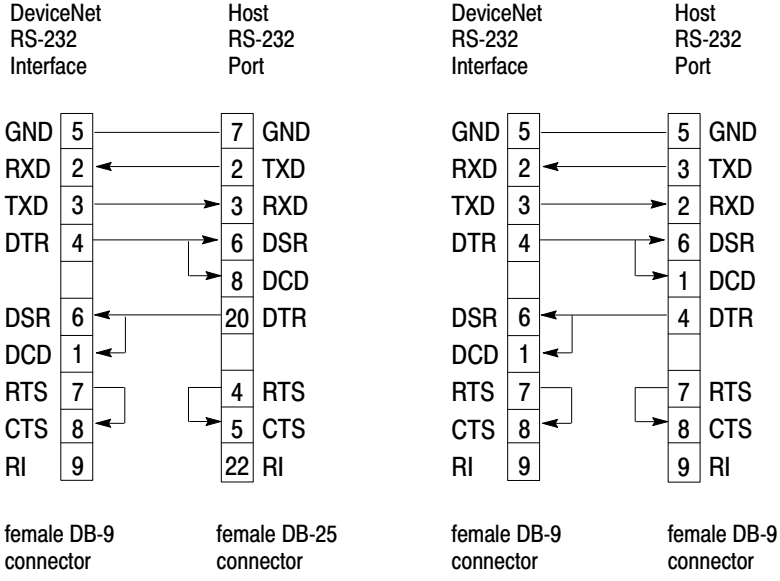
The module can supply power to a device in a point-to-point connection. The device being powered in a point-to-point connection can draw a maximum of 100 mA at 12V dc ±5%.

Connecting Cables via RS-232 to a Computer

Use the wiring key molded on the bottom of the 1770-KFD module when connecting the RS-232 cable to a computer.



Use these wiring configurations:

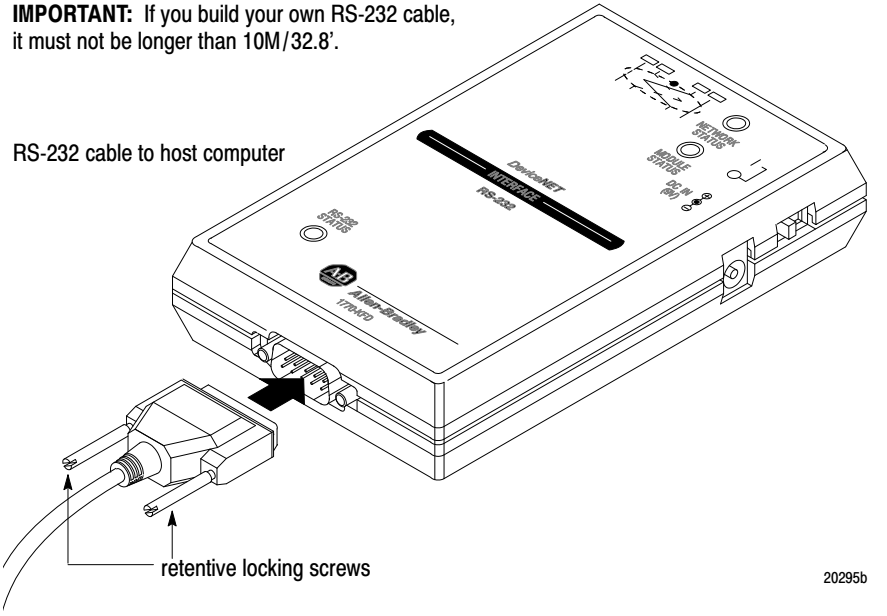

DeviceNet RS-232 Interface
Host RS-232 Port
GND 5 — 7 GND
RXD 2 — 2 TXD
TXD 3 — 3 RXD
DTR 4 — 6 DSR
8 DCD
DSR 6 — 20 DTR
DCD 1
RTS 7 — 4 RTS
CTS 8 — 5 CTS
RI 9 — 22 RI
female DB-9 connector
female DB-25 connector
DeviceNet RS-232 Interface
Host RS-232 Port
GND 5 — 5 GND
RXD 2 — 3 TXD
TXD 3 — 2 RXD
DTR 4 — 6 DSR
1 DCD
DSR 6 — 4 DTR
DCD 1
RTS 7 — 7 RTS
CTS 8 — 8 CTS
RI 9 — 9 RI
female DB-9 connector
female DB-9 connector

RS-232 Cable Connections (via 9-pin serial port connector)

These pin numbers correspond with these connections:

pin number	abbreviation	description	direction
1	DCD	data carrier detect	in
2	RXD	receive data	in
3	TXD	transmit data	out
4	DTR	data terminal ready	out
5	GND	signal ground	–
6	DSR	data set ready	in
7	RTS	request to send	out
8	CTS	clear to send	in
9	RI	ring indicator	in

Connect the 1770-KFD module to a computer by using the RS-232 cable.



Using the Interface Module with a Portable Computer

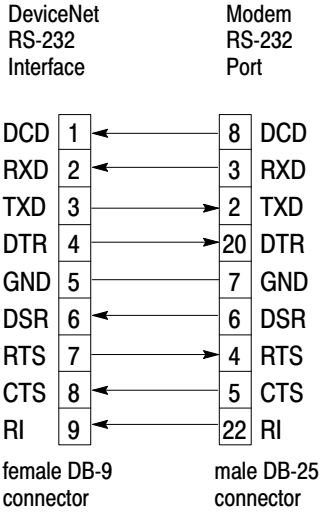
Some portable computers have power-saving modes that power down the serial ports during inactive periods, occurring most often when batteries power the PC. The serial-port power-saving feature causes the RS-232 interface module to go offline and to cease communication with DeviceNet Manager. You should disable the serial-port power-saving feature to use the RS-232 interface module with DeviceNet Manager.

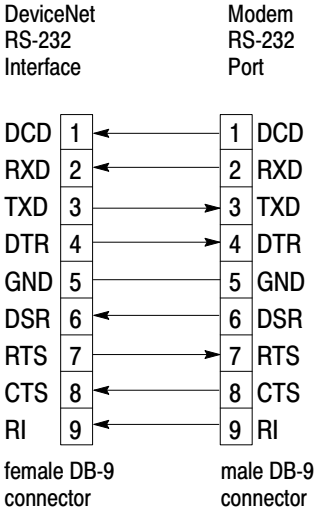
If you experience a problem with the RS-232 interface module going offline unexpectedly, use the setup program of your portable computer to disable the serial-port power-saving feature.

Connecting Cables via RS-232 to a Modem

You can connect a 1770-KFD module to these standard dial-up modems:

- DTE-controlled answer
- auto-answer

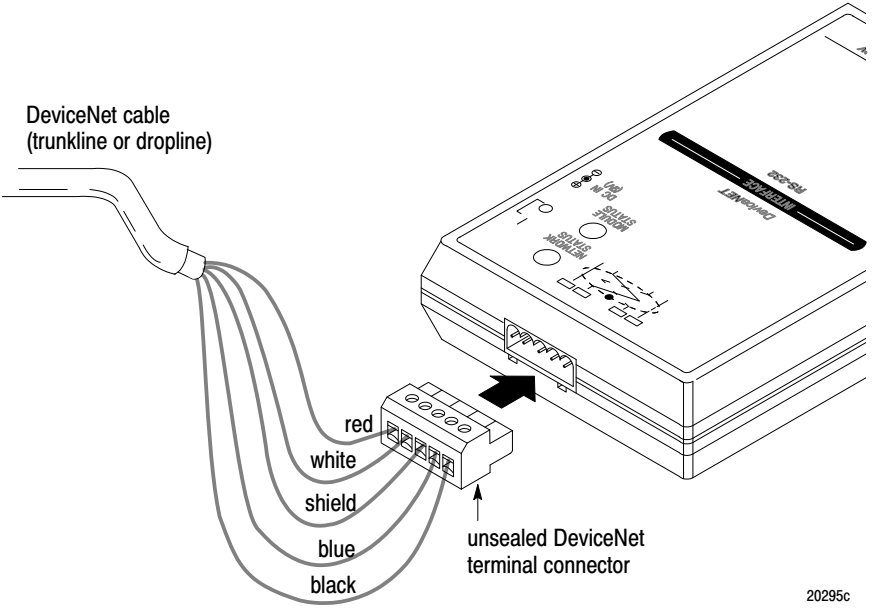




Connecting Cables via DeviceNet

Follow these steps to connect the 1770-KFD module to a DeviceNet network:

1. Connect the DeviceNet cable (trunkline or dropline) to the unsealed DeviceNet terminal connector.



2. Connect the terminal connector to the 1770-KFD module.

Important: DeviceNet cable connections should match color bars/electrical diagram on top of 1770-KFD module. See the table below.

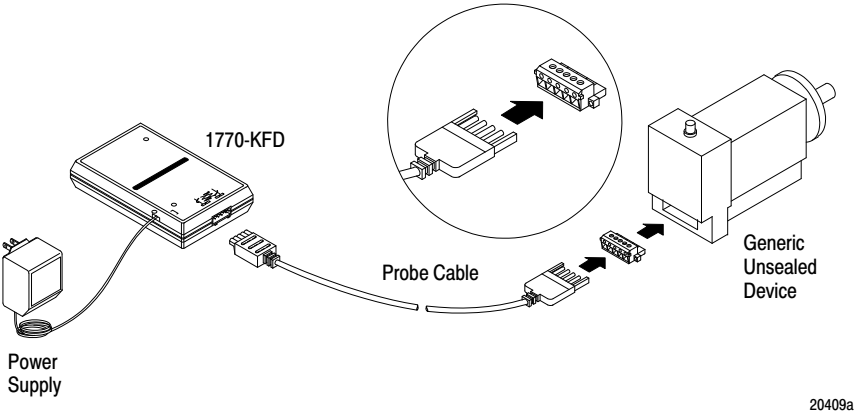
pin number	wire color	abbreviation	description
1	black	V–	power return
2	blue	data low	data line
3	clear	shield	between cable jacket and wire
4	white	data high	data line
5	red	V+	positive voltage (hot)

Connecting the 1770-KFD Module to DeviceNet Devices (Point-to-Point)

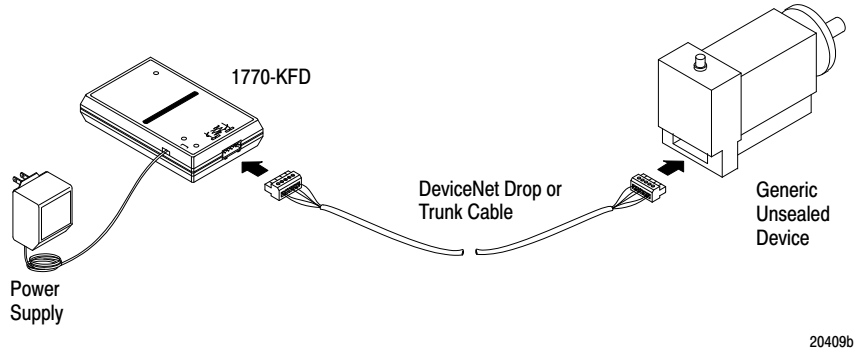
You can connect the module to a sealed or an unsealed device in a point-to-point configuration.

Connect to an **unsealed device** in one of two ways:

- use a 1787-PCABL probe cable

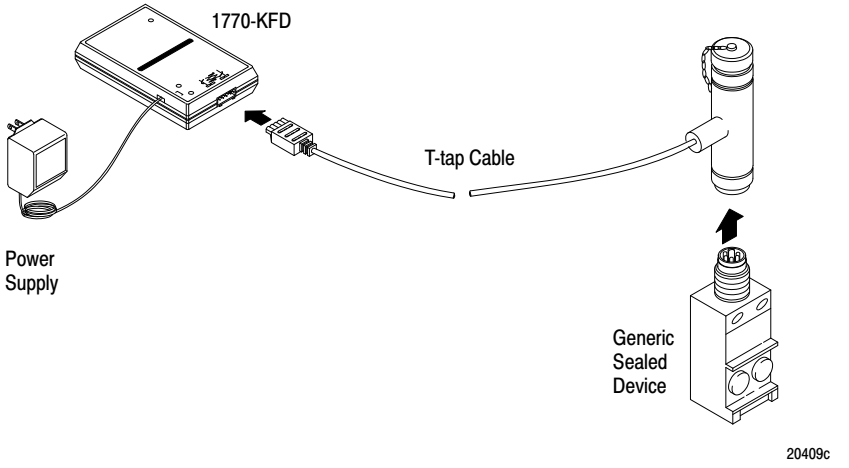


- use DeviceNet drop or trunk cable

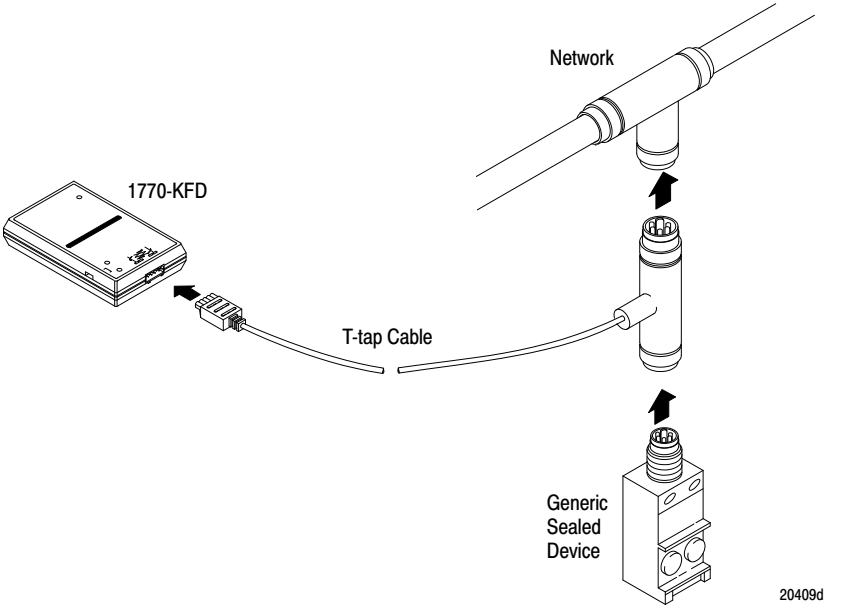


Connect to a **sealed device** in one of three ways:

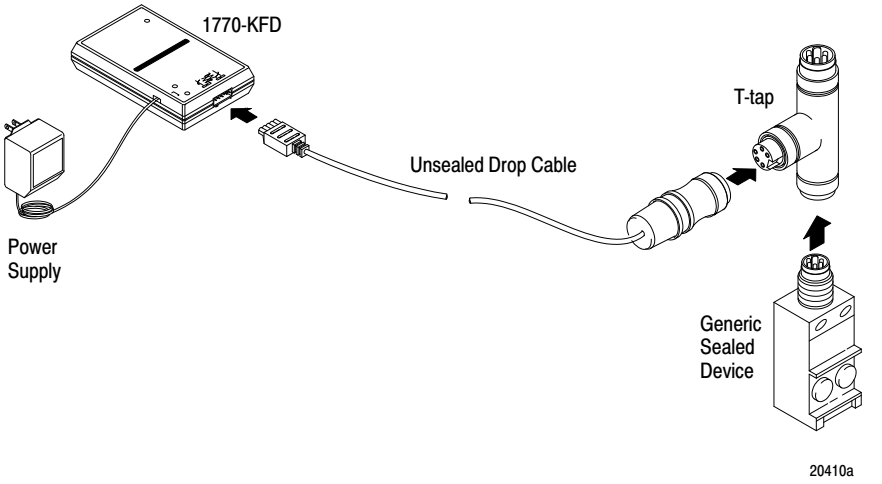
- use a 1787-TCABL T-tap cable (and power supply)



- use a 1787-TCABL T-tap cable (and draw power from the network)



- use a 1787-MCABL unsealed drop cable (and power supply)

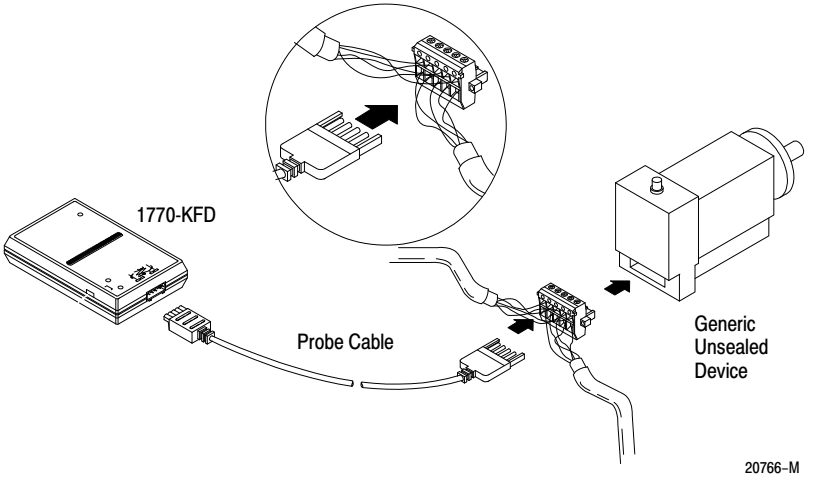


Probing a Network

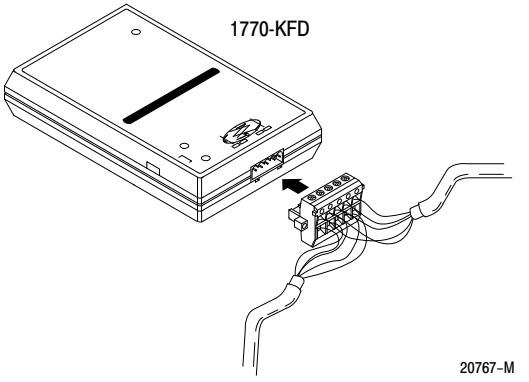
You can probe a sealed or an unsealed network with the 1770-KFD module.

Probe an **unsealed network** in one of two ways:

- use a 1787-PCABL probe cable

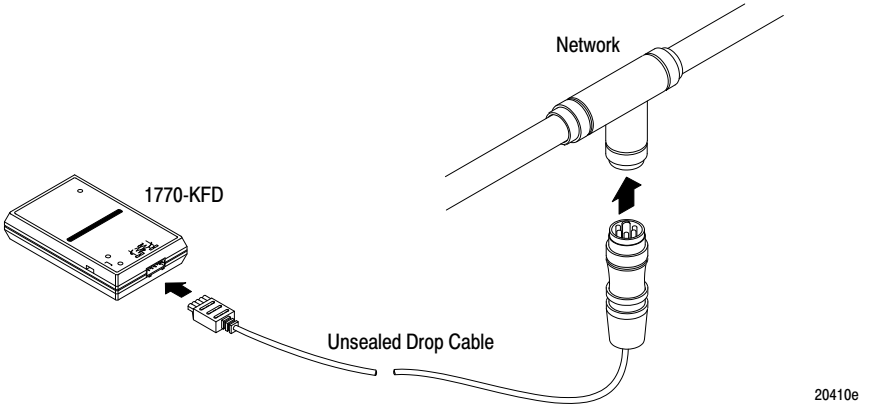


- use a DeviceNet terminal connector



Probe a **sealed network** in this way:

- use a 1787-MCABL unsealed drop cable



Installing the 1770-KFD Driver

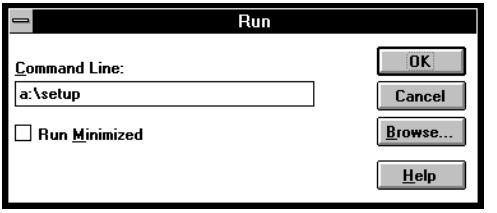
If you are using a WinDNet™-compatible application, you must install the 1770-KFD driver.

Follow these steps:

1. Start Windows 3.1, Windows 95, or Windows NT.
2. Select Run from the File menu.
3. On the command line, type

   ```
   a:\setup
   ```

   as shown here:



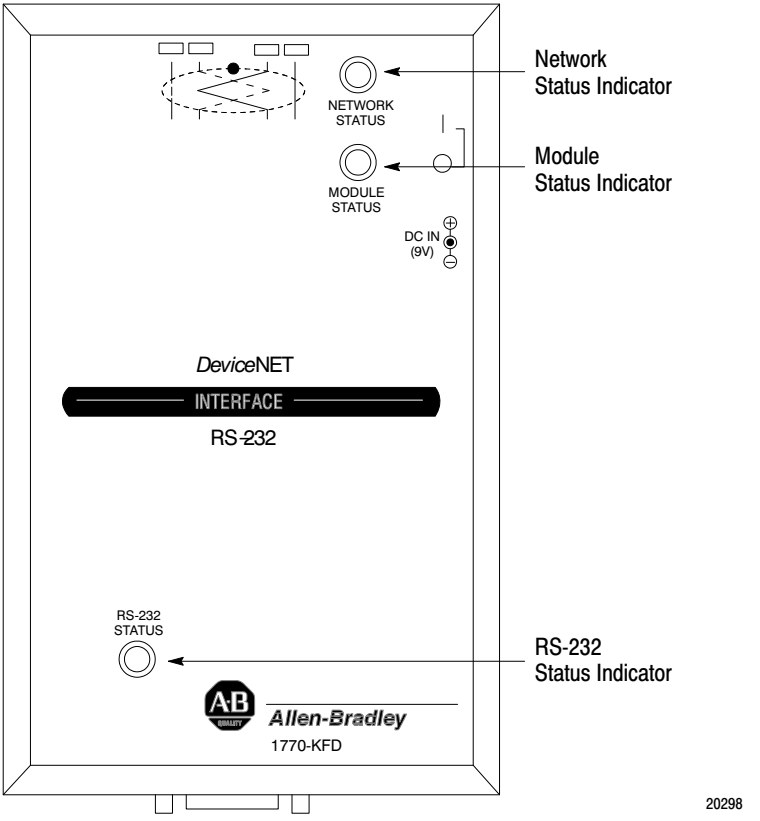
4. Press OK.
5. Follow the instructions in each dialog box until you see the message:

   ```
   Installation Complete
   ```

Interpreting Status Indicators

The three status indicators on the module give you information about your network and its connections. Figure 4 identifies each status indicator.

Figure 4
Status indicator locations



The tables on page 24 outline the indicator condition and the corresponding status, and explain what each condition means to you.

Module Status Indicator

condition	status	indicates
off	no power	no power applied to device
solid green	device OK	device is operating in normal condition; KFD module is on line, i.e., has baud rate detected
flashing green	not configured	device is operating in normal condition; waiting for initialization from host (in 'autobaud' mode)
solid red	critical fault	device has unrecoverable fault; replace it
flashing red	non-critical fault	device has recoverable fault; to recover: • reconfigure device • reset device • perform error recovery

Network Status Indicator

condition	status	indicates
off	off line	KFD DeviceNet is off line
flashing green	on line	KFD DeviceNet is on line, but not communicating
solid red	link failed (critical)	device has detected an error that has rendered it incapable of communicating on the link; for example, detected a duplicate node address or network configuration error
solid green	on line, communicating	data being transmitted or received

RS-232 Status Indicator

condition	status	indicates
off	no activity, link OK	no communication activity
flickering green	activity, link OK	data being transmitted or received
solid red	link failed (critical)	device has detected an error that has rendered it incapable of communicating of the link
flashing red	link failed (non-critical)	device has detected recoverable fault; for example, detected an incorrect baud rate or parity error

Specifications

communication rate	RS-232 selectable rates: • 1200 baud 19,200 baud • 2400 38,400 • 4800 57,600 • 9600 DeviceNet selectable rates: • 125K baud • 250K • 500K
function	to monitor and configure devices on DeviceNet network
location	anywhere via personal computer
communication port	one 9-pin RS-232 D-shell
cabling	RS-232 cable; see cable diagrams
power requirements:	
• ac wall	9V @ 1 amp
• DeviceNet connector	11 – 25V @ (700mA – 300mA)
ambient temperature rating:	
• operational	0 to 50°C (32° to 122°F)
• storage	–40°C to 85°C (–40° to 185°F)
ambient humidity rating	5% – 95%
physical:	
• size	5.125 x 3.25 x 1.125 in. (13.017 x 8.255 x 2.857 cm)
• weight	5.5 oz (156 gm)
Agency Certification (when product or packaging is marked)	• CSA certified • CSA Class I, Division 2 Groups A, B, C, D certified • UL listed • CE marked for all applicable directives

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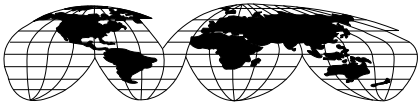

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